Washington State Educational Technology Plan:

A Blueprint for Washington's K-12 Common Schools and Learning Communities

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A Blueprint for Washington's K-12 Common Schools and Learning Communities

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Executive Summary

In 1994, Washington State issued its first educational technology plan. Since then tremendous changes have occurred in how educational technology—*"the combination of human imagination, inventiveness and electronic tools that transform ideas into reality to meet a need or solve a problem"*—is applied to Washington's learning and teaching needs.

In September 2001, the Superintendent of Public Instruction, Dr. Terry Bergeson, re-convened the Educational Technology Advisory Committee (ETAC) to update the educational technology plan and to update the vision for the use of educational technology in Washington schools. Two major policy issues drove this undertaking: Washington's state education reform legislation mandates on-going educational technology planning; and the recently enacted federal Elementary and Secondary Education Act (ESEA) requires Washington and other states to articulate what "technology literacy" means for our students and to develop initiatives to improve academic achievement in high poverty schools.

From the start, the ETAC made it clear that their vision and expectations for educational technology transcended the notion of merely satisfying state and federal requirements. The advisory committee focused more broadly on how Washington State can best apply educational technology effectively and appropriately to meet student learning needs, ensure that all schools are performing at high levels, and advance Washington State's strategic goals for education policy. They also considered the critical stakeholders involved in educational technology in the school, community, and public policy arenas.

Educational technology is making a difference in Washington's schools. Multiple educational technology initiatives abound. Washington's advanced K-20 Educational Telecommunications Network, connecting hundreds of learning centers statewide, provides the dedicated high speed network needed to reliably infuse educational technology into curriculum, instruction, and assessment.

Yet educational technology in K-12 schools in Washington is at a crossroads. Without sustained professional development and standards, the most critical actors involved in educational technology—teachers, students, and educational leaders—will not be able to take advantage of the tools at hand. Scarce resources may be squandered on applications that are never used to their full potential.

Educational technology must not become an indicator of a school's wealth. That could easily happen without examining more closely Washington State's policy and funding objectives for educational technology. Technology disparities between well-funded districts versus struggling schools in poorer districts has created equity and adequacy issues for many schools that can only be addressed through state-level policy making.

Comparing the potential for educational technology with its implementation across the state, the Educational Technology Advisory Committee developed twelve recommendations to capitalize on the strengths of Washington's educational technology and apply it effectively and equitably in the coming years. The twelve recommendations are comprehensive and they address significant educational needs in several key areas:

- *Standards and Professional Development:*
  - *Teacher, Pare-professional, and Educational Leader Technology Standards and Professional Development*
  - *Pre-service Educational Technology Training*
  - *Student "Technology Literacy" Standards*
- *Fiscal Policy and Strategic Funding:*
  - *Flexibility in Bonds and Levies*
  - *State Educational Technology Funding/Revolving Fund*
  - *Enhanced Educational Technology Support*
- *Learning and Teaching Support:*
  - *Enhanced K-20 Educational Telecommunications Network*
  - *Targeted Support for Needy Schools*
  - *Digital Educational Content*
  - *Best Practices in Educational Technology*
  - *Community Engagement Through Educational Technology*
  - *Statewide Data-Driven Decision Making System.*

Several of the twelve proposed recommendations, if adopted, could provide significant cost savings and overall improvements in educational technology throughout Washington State by harmonizing approaches, leveraging state economies of scale in infrastructure and content, and focusing scarce resources on proven strategies that improve student academic achievement.

A strong planning process is not a one-time event. Looking to the future, the Educational Technology Advisory Committee will continue developing and evaluating these and related recommendations. The advisory committee will also measure success over time and report to schools, the Legislature, the Superintendent of Public Instruction, and other stakeholders on the continuing technological achievements and challenges in Washington's educational system.

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1.0 Introduction

This section discusses the purpose, background, and organization of the educational technology plan.

1.1 PURPOSE

The purpose of the 2002 educational technology plan is to:

- Meet state and federal educational technology planning requirements
- Inform and educate stakeholders on the educational technology planning process
- Provide a current snapshot on current educational technology progress, identify key performance measures for future success, and evaluate success over time
- Identify best practices, resources, and current issues in educational technology
- Provide guidance to key stakeholders on educational technology implementation.

1.2 BACKGROUND

The Superintendent of Public Instruction must develop and periodically update a statewide educational technology plan with the assistance of an educational technology advisory committee (ETAC). The planning process evaluates:

- School and school district planning, implementation, and staff training in the use of technology in curriculum, instruction, assessment, and administration
- The status of electronically connecting school districts, institutions of higher learning, and other sources of online information
- Equitable methods to increase educational technology use by students and school staff statewide
- Funding recommendations and requirements for educational technology.

The Superintendent of Public Instruction published the first educational technology plan in 1994, with addenda in 1996 and 2000, and minor draft revisions in 1998. Tremendous changes have occurred between 1994 and 2002 both in educational technology and the way in which education in Washington's public schools is used.

Today the educational technology opportunities and challenges are even greater than they were when Washington's education reform movement was conceived in 1993. Schools have access to a broader and richer variety of educational technology hardware, software, and media resources. Yet teachers and students face new teaching and learning standards that demand

increasingly effective and appropriate use of educational technology. Providing more hardware is necessary but insufficient. Teachers and their students need the human element as well to make educational technology work effectively—professional development and adequate resources must accompany technology infusion in the classroom.

Educational Technology Planning Process

Several requirements and initiatives drive the need for a state educational technology plan. First, state education reform legislation requires periodically updating the state educational technology plan. In accordance with RCW 28A.650.015, the Superintendent of Public Instruction must "develop and implement a Washington state K-12 education technology plan" that must be updated "on at least a biennial basis" and should be developed "to coordinate and expand the use of education technology in the common schools of the state."

Second, recently enacted legislation under the federal Elementary and Secondary Education Act (ESEA or "No Child Left Behind Act") requires state technology planning in order to receive federal funding under the act. The federal legislation requires Washington to undertake state- and district-level technology planning, articulate "technology literacy" for students, and focus educational technology efforts on children in poverty and at-risk of academic failure.

Finally, rapid increases in educational technology development, dissemination, and practice requires a new statewide perspective on how technology is furthering educational goals under Washington's education reform efforts and what issues need to be addressed.

The Superintendent of Public Instruction is required by RCW 28A.650.105 to appoint an Educational Technology Advisory Committee (ETAC) to "assist in the development and implementation of the technology plan" with representatives from a wide range of educational stakeholders. The Superintendent of Public Instruction, Dr. Terry Bergeson, re-convened the ETAC for the 2002 educational technology planning process on September 7, 2001. The ETAC has met several times during 2001-2002. The Office of Superintendent of Public Instruction (OSPI) established Working Groups to assist the ETAC in developing recommendations on:

- Student Competencies
- Teacher Competencies
- Administrator Competencies
- Facilities & Infrastructure/Networking Standards
- Successful Practices in Professional Development
- Successful Practices in Funding & Support.

This report is the result of the sustained dedication of the advisory committee members and its supporting Working Groups. ETAC volunteers have come together on multiple occasions—frequently using videoconferencing technology, electronic mail, and the Internet—to discuss and define how educational technology can and should be used appropriately to improve achievement and lifelong outcomes for students in Washington's public schools. This report is the product of their work.

Appendix A provides additional information on the ETAC membership and the Working Group participants.[1]

1.3 ORGANIZATION OF THIS REPORT

This report will be provided in two alternative formats: a paper report and a companion Internet Web site, to be launched in December 2002.

Paper Report

This paper report describes the findings and conclusions of the Educational Technology Advisory Committee. Specifically, the report describes:

- *Legislative charge*—state and federal requirements that drive the educational technology planning process
- *Vision*—the Educational Technology Advisory Committee's vision for educational technology
- *Key Concepts*—the conceptual framework for educational technology in Washington's schools, namely, how educational technology contributes to high performing schools and the interdependent nature of multiple stakeholders in educational technology
- *State of the State*—district, regional, statewide educational technology initiatives, funding, and policy issues
- *Gap Analysis*—what the research says and how Washington State compares
- *Recommendations and Priority Action Items*—for policy makers, schools, communities, and others
- *Appendices*—the educational technology planning process, bibliography, relationship of educational technology to education reform standards, 1994 technology plan recommendations, and current educational technology initiatives.

Several conventions are used in the educational technology plan. Most information sources may be found online. Rather than citing Internet addresses repeatedly throughout the document or citing multiple Internet addresses on one page, the endnotes provide an Internet

source or a reference source. Additional information is provided in a companion bibliography (Appendix B). The bibliography allows the reader to obtain additional reference information, including Internet address, sponsoring organization, and a brief abstract, and review selected programs and organizations. In limited cases, Internet addresses are provided in the text of the report when an example or information resource may be particularly useful to pursue directly online.

Companion Web Site

After publishing the paper report, OSPI will provide a Web-based version of the educational technology plan. In addition to providing the contents of the paper report of the Educational Technology Advisory Committee in an online menu-driven format, the companion Internet Web site will provide:

- Links to additional resources
- Information specifically related to key stakeholder groups involved in educational technology, including policy makers, teachers, student, parents, and network administrators. For instance, teachers can find online professional development and training resources suited to their specific curriculum, instruction, and assessment needs, while network administrators can review hardware and network standards and protocols. School districts will be able to link to best practices in educational technology and see what other districts are doing statewide and in other online communities
- Links to interactive assessment tools to help guide education leaders, teachers, and administrators through their technology planning process.

2.0 Legislative Charge

This section describes state and federal legislative requirements and associated educational technology resources, including education reform legislation and the federal Elementary and Secondary Education Act (ESEA).

2.1 STATE LEGISLATIVE CHARGE

Educational technology requirements are infused throughout Washington's education reform effort.

Education Reform Legislation[2]

In 1990, with the establishment of the Governor's Council for Education Reform and Funding (GCERF), education reform became a focus for all stakeholders in Washington State. As the Council's subgroups focused on specific topics ranging from learning outcomes to governance, there was an emerging recognition of the critical role technology must play in shaping the system. At the request of the Council, Judith A. Billings, then State Superintendent of Public Instruction, convened an Ad Hoc Technology Task Force to provide the Council with recommendations regarding the role technology should play in education reform.

The Council incorporated many of the ad hoc task force's recommendations into their report to the legislature. The GCERF recommendations to the legislature included initial recommendations for $50 million during the 1993-95 biennium to build technology infrastructure and support local district efforts in technology.

During the 1993 legislative process the GCERF report evolved into Engrossed Substitute House Bill (ESHB) 1209 which was enacted by the Washington State Legislature. Washington's 1993 Education Reform Act required the development of academic content standards for all students in eight core content areas which included: reading, writing, communications, mathematics, science, social studies, the arts, and health and fitness. The Commission on Student Learning developed the process for developing these content standards and the system for assessing student progress towards meeting these requirements. The 1993 law required the establishment of timelines for the development of the academic content standards (Essential Academic Learning Requirements—EALRs) and an aligned assessment system. As required by this legislation, the full implementation of the statewide standards and assessment system was effective in 2000.

As required by the state's education reform legislation, the Commission created eight subject advisory committees to develop the EALRs in the eight core content areas. Each group was composed of public and private school educators, parents, community members, business

people, and high school students. More than 400 people participated in the development of these academic content standards.

After their initial development, the EALRs were presented for review in a number of public forums for discussion and revision. The outcome of these thoughtful public debates and research reviews was the 1995 formal adoption of the reading, writing, communication, and mathematics EALRs. By 1998 the remaining four content area Essential Academic Learning Requirements were adopted. During the last four years, minor edits have been made in all of the academic content standards. These have occurred through a process much like the initial development phase where a representative group reviewed and implemented changes. These changes were then reviewed by the greater public and put into place.

Since 1995 Washington has had in place academic content standards (EALRs) in reading, writing, communications, and mathematics. The standards were developed for all children at three grade spans (elementary, middle/junior high, and high school). Specific benchmark and component level requirements on what children should know and be able to do are defined in each subject area. The standards are rigorous and require higher level thinking on the part of all students. The Washington Assessment of Student Learning is administered annually to students in grades four, seven, and ten to assess student achievement in relation to these benchmarks.

The Washington State Legislature, through the 1993 Education Reform Act (ESHB 1209) also directed the Superintendent of Public Instruction to develop a state technology plan for K-12 schools with the assistance of a statewide Educational Technology Advisory Committee (ETAC).[3] Past efforts have included integrating technology into the EALRs and identifying statewide technology development requirements in support of education reform efforts. The link between the EALRs and educational technology are shown in Appendix C.

The 1994 state educational technology plan described a number of initiatives underway at that time in support of education reform efforts, including:

- Technology support to school districts through the Educational Technology Support Centers in each of the nine educational service districts (ESDs)
- Enhancement of the statewide data network
- Networking consultants for local schools
- Interactive videoconferencing services
- On-line curriculum projects

- Fiscal allocations to schools for educational technology investments.

The 1994 state plan also provided twelve recommendations pertaining to educational technology policies, resources, and implementation. The twelve 1994 recommendations (see Appendix D) addressed leadership, resource, and implementation issues. Section 6, Gap Analysis, provides a progress review and examines the status of the original 1994 recommendations.

2.2 Elementary and Secondary Education Act (ESEA)

H.R. 1, the "No Child Left Behind Act," passed by Congress in late 2001 and also known as the re-authorized Elementary and Secondary Education Act (ESEA),[4] has significant policy and fiscal implications for educational technology planning. The major focus of the ESEA is to provide all children with a fair, equal, and significant opportunity to obtain a high quality education. The act is based on four conceptual "pillars:"

1. Accountability
2. Flexibility
3. Research-based Education
4. Parent Options.

The following sections provide a brief overview of the federal legislation.[5] The information provided below in no way fully represents what is required by ESEA but rather is intended to focus on the provisions with educational technology components. Additional funding information is provided in Section 5.2, Funding.

Title II, Part D: Enhanced Education Through Technology

Title II, Part D—preparing, training, and recruiting high-quality teachers and principals—provides funding for Enhancing Education Through Technology ("E2T2").[6] Technology funding will be provided through a state formula as well as through competitive grants. Funds may be used for promoting state and local technology initiatives to increase student achievement, increase access to technology, and improve and expand teacher professional development in technology.

Fifty percent of the available local education agency (LEA) technology funds will be distributed to eligible applicants on a formula basis. The remaining 50 percent will be used for a competitive grants program. A feature of the competitive grants program will be the use of a Technology Index developed by OSPI to determine needs. The Technology Needs Index is based on student socioeconomic measures, assessment results, and the school ratio of students to computers.

Title II, Part D funds for technology in Washington state will be distributed for the 2002-2003 school year via the state's "NO LIMIT" Project (New Outcomes and Learning Improvement in Mathematics, Integrating Technology). The project goal is to improve proficiency for middle school mathematics students. OSPI will be targeting high poverty, high need schools. OSPI will encourage schools that receive small allocations to form consortia to acquire services through their ESD. OSPI will also provide information on research-based technology initiatives to these districts.

The NO LIMIT project develops classroom models where middle school students are using technology-infused, project-based learning to improve their achievement in mathematics. Performance indicators of successful implementation have been developed and are being evaluated by the Woodring Applied Research and Development Center at Western Washington University (WWU). Indicators include monitoring student progress every six weeks, classroom observation of teachers, teacher logs, and use of a dedicated Web site to support the project and provide immediate intervention if a teacher is not being successful. An interim evaluation report from WWU indicates that the anticipated results are developing at the pace expected. The performance objective is to increase scores on the mathematics portion of the 7th Grade WASL for students who have participated in the project during 6th and 7th grades. The WASL that will be administered in spring 2003 will be the data source to measure the level of success.

Washington's goal for the allocation portion of the grant is for more teachers to be trained in the integration of technology into the curriculum, increase their use of research-based project models, and increase student technology literacy. However, with an average allocation of $4 per student, OSPI's expectations are modest. Data sources will include the Technology Need Index, updated school district technology plans, and information collected in the end-of-year reports. The grant application process began May 2002, with final awards to be provided in September 2002.

State level activity funds from Title II, Part D will be used to support the Online Development Center (ODC), located at Puget Sound ESD. The ODC will provide multiple levels of support to meet the Web site needs of the Enhancing Education Through Technology (E2T2) grantees. The ODC will:

- Create web-based showcases to show new strategies and implementations;
- Play an active role in gathering and posting material for the various sections on the web;
- Provide Web site training to technology/curriculum integration specialists and other participants;
- Integrate the Blackboard server and other Web site functions when applicable; and

- Maintain the web server, database, and HTML pages for use statewide.

Title III, Part A, Section 3115

Title III, Part A, Section 3115 provides grants to improve the education of limited English proficient (LEP) children by assisting the children to learn English and challenging state academic content and student achievement standards. This includes improving instruction for LEP children through appropriate educational technology and/or participation in electronic networks.

Title IV, Part B, 21st Century Community Learning Centers.

The 21st Century Community Learning Centers (CCLC) provide safe, educational after school youth programs. Currently there are 52 programs statewide.

The 21st CCLC advisory group will assist in identifying, collecting and disseminating effective instructional programs, practices, resources and scientific research. OSPI will provide support and assistance through the regional model by identifying and providing training on implementing effective instructional programs and practices based on scientific research, and through an information clearinghouse.

Other Provisions

"Technology Literacy"

Additionally, the educational technology plan must address strategies for improving student academic achievement, including "technology literacy", which is not explicitly defined in the act.[7] Improvements in technology literacy will be measured by several activities that the ETAC has already undertaken:[8]

- The recently adopted vision statement for the updated educational technology plan
- The adopted International Society for Technology in Education (ISTE) Technology Foundation Standards for Students as Washington State's recommended standards for all districts
- The adopted ISTE Technology Standards for teachers as Washington State's recommended standards for all districts
- The adopted ISTE standards for school educational leaders as Washington State's recommended standards for all districts
- Supporting ETAC recommendations.

Federal Technology Study

By 2006, the U.S. Department of Education must conduct an independent, long-term study using scientifically based research methods and control groups or control conditions. The study must evaluate the conditions and practices that:

- Demonstrate effective educational technology applications in increasing student academic achievement
- Increase the ability of teachers to integrate technology effectively into curricula and instruction to enhance learning environment and opportunities and that increase student academic achievement, including technology literacy.

Updated Federal Technology Plan

Within one year, states must update their federal educational technology plan. The plan must describe how it will promote:

- Higher student academic achievement by integrating advanced technologies, including emerging technologies, into curricula and instruction;
- Increased access to technology for teaching and learning for schools with a high number or percentage of children from families with incomes below the poverty line; and
- The use of educational technology in Washington's education reform efforts.

3.0 A Vision for Educational Technology

Although meeting state and federal educational technology planning requirements is essential, the ETAC adopted a broader vision for Washington's continuing educational technology development. This section describes the advisory committee's vision statements and the singularly important definition of "educational technology."

3.1 VISION AND BELIEF STATEMENTS

Expanded Version

In a society increasingly dependent on information and knowledge, equitable and universal access to technology, media and information resources is essential to the learning process. With access to and proficiency in the use of these tools, and with the guidance of skilled educators and community members, all students have the opportunity to become actively engaged and take responsible roles in their learning as they think, create, conduct inquiries, solve problems and communicate in individual, collaborative and interdisciplinary settings.

As a result, students emerge as lifelong learners, productive members of the workforce, and citizens that can effectively contribute to our democratic way of life.

Short Version

Education today requires the knowledge and skills to utilize technology, and equitable and universal access to it.

3.2 EDUCATIONAL TECHNOLOGY DEFINED

While technology*, in its broadest sense, can be defined as "the practical application of knowledge" (from Webster's online dictionary), in this document we define* educational technology *to be "the combination of human imagination, inventiveness and electronic tools that transform ideas into reality to meet a need or solve a problem."*

Educational technology includes hardware (computers, handheld devices, printers, digital cameras), software and content applications (programming classes, productivity software), and media (the Internet and videoconferencing).

Educational technology may be applied in several ways:

- For learning and academic achievement in the classroom—curriculum and instruction
- For sharing information and best practices—professional development through regional, statewide, and federal initiatives and funding sources

- For monitoring and diagnosing student achievement and professional development—assessment and reporting of results, interactive (online) information resources on school characteristics, and analytic tools.

- To facilitate school administration and organizational effectiveness—grade checkers, productivity software, attendance monitoring, compiling information, and communicating with students, peers, administrators, parents, and others.

Stated simply, educational technology is not computers, software, and the Internet. Educational technology is, ultimately, "*the combination of human imagination, inventiveness and electronic tools that transform ideas into reality to meet a need or solve a problem.*"

4.0 Key Concepts for Educational Technology

This section discusses the conceptual relationship between educational technology and high performing schools, OSPI's strategic planning goals, the interdependent nature of key stakeholders involved in educational technology, and related key concepts that have guided the ETAC throughout the educational technology planning process. Overall, this section of the educational technology plan emphasizes:

- Relating educational technology goals to the characteristics of high performing schools and to OSPI's strategic planning objectives
- Underscoring the interdependent nature of stakeholders involved in educational technology planning, including policy makers, school educational leaders, educators, other staff, and the local teaching and learning communities
- Endorsing learning and teaching philosophies that support the appropriate and effective integration of educational technology into curriculum, instruction, and assessment practices.

4.1 EDUCATIONAL TECHNOLOGY AND HIGH PERFORMING SCHOOLS

The ETAC reviewed several conceptual frameworks and examined their applicability to Washington State's technology planning process. Such frameworks help policy makers and educators evaluate educational technology in general and the progress of schools and district educational technology efforts in particular. The advisory committee reviewed several frameworks for their potential applicability to Washington's efforts. Candidate frameworks included:[9]

- The Milken Foundation's "7 Dimensions for Gauging Progress" (Lemke and Coughlin, 1998)
- The North Central Regional Educational Laboratory's enGauge framework that outlines "Six Essential Conditions for the Effective Use of Technology in Learning"[10]
- OSPI's "Nine Characteristics of High Performing Schools."
- The CEO Forum's interactive "School Technology and Readiness (StaR) Chart"[11]

For instance, the Milken Foundation's "7 Dimensions for Gauging Progress" considers the role of educational technology in terms of:

1) Learners

2) Learning Environments

3) Professional Capacity

4) System Capacity

5) Community Connections

6) Technology Capacity

7) Accountability.

A conceptually strong framework should be based on empirical research that clearly identifies critical factors related to the successful application of educational technology. It should allow policy makers, educators, and other stakeholders to examine the key dimensions of educational technology, for instance, "Professional Capacity," and then provide specific measures to assess Washington State's particular strengths or limitations in this area.

The advisory committee focused on OSPI's "Nine Characteristics of High Performing Schools" due to its unique application to Washington's education reform efforts, the complementary relationship of educational technology and the nine characteristics, and the advisory committee's explicit goal to link educational technology to student achievement, i.e., high performing schools within the context of Washington's education reform efforts. High performing schools have:

1. *A clear and shared vision and purpose.*
2. *High standards and expectations for all their students.*
3. *Effective leadership in both instructional and administrative areas.*
4. *High levels of teamwork.*
5. *Aligned their curriculum and instruction with the state standards and assessments.*
6. *Closely monitored teaching and student progress.*
7. *Emphasized professional development.*
8. *A supporting learning environment.*
9. *A high level of community involvement.*[12]

The "Nine Characteristics of High Performing Schools" is based on OSPI's evaluation of twenty recent research studies that examined the common characteristics of high performing schools. Several studies were reviews of other research that has taken place over many year on the same topic, while others examined these schools in specific settings and locations, such as

high performing elementary schools in a large urban setting. This body of research represents findings from both Washington State and around the nation.

OSPI staff analyzed the studies to determine what characteristics were found most often among high performing schools. Performance was usually measured in terms of high or dramatically improving scores on standardized tests, often in difficult circumstances such as high levels of poverty. In every case, there was no single factor that accounted for the success or improvement. Instead, the research found that high performing schools tend to have a combination of common characteristics. Some reports found as few as five characteristics, while others found many more. OSPI's analysis of these characteristics narrowed these lists into nine areas.

By focusing educational technology on the dimensions of high performing schools, the ETAC addresses a recurring issue that has faced educational technology throughout Washington's education reform efforts, namely, *"How does educational technology contribute to a successful school, and under what conditions?"*

4.2 EDUCATIONAL TECHNOLOGY AND OSPI STRATEGIC GOALS

Another key concept is the linkage of the educational technology planning process with OSPI's strategic goals. OSPI, through its strategic planning process, has developed several overarching goals that provide a state-level perspective on Washington's educational strategy for the next five years. The four goals are:

1. *All students demonstrate high levels of achievement in the four state learning goals,*[13] *and successfully graduate from high school.*
2. *All students in Washington have high quality educators, staff and educational leaders supporting their success.*
3. *All students learn in a safe, civil, healthy, and engaging environment.*
4. *All Office of the Superintendent of Public Instruction (OSPI) staff use integrated, sound management and operational practices to ensure excellence in internal and external customer services.*

The educational technology planning process takes these goals into consideration. In summary, Table 4.1 shows the relationship between OSPI's strategic planning goals, the nine characteristics of high performing schools, and educational technology.

Table 4.1. Educational Technology Contribution to 9 Characteristics of High Performing Schools and OSPI Strategic Goals

Strategic Goal	Characteristics of High Performing Schools	Educational Technology Contribution
Goal 1—All students demonstrate high levels of achievement in the four state learning goals and successfully graduate from high school.	Clear and Shared Focus	• Provide effective media to communicate expectations to students and to promote student "buy-in" to clear and shared focus
	High standards and expectations for all students.	• Support achievement of Essential Academic Learning Requirements • Provide "technology literacy" for 21st century citizens
	Curriculum, instruction, and assessment aligned with standards	• Support content delivery and enhancements • Facilitate gathering, analyzing, and synthesizing assessment data in meaningful ways
	Frequent monitoring of learning and teaching	• Make monitoring less burdensome and more focused • Provide diagnostic tools for learners
Goal 2—All students in Washington have high quality educators, staff and educational leaders supporting their success	Clear and Shared Focus	• Communicate expectations to educators, staff, and educational leaders • Support "buy-in" to clear and shared focus
	Effective school leadership	• Define the critical role of technology literacy for successful 21st century educators and educational leaders
	High levels of collaboration and communication	• Make collaboration and communication more effective and efficient
	Curriculum, instruction, and assessment aligned with standards	• Support content delivery and enhancements • Facilitate gathering, analyzing, and synthesizing assessment data to inform instructional practice
	Frequent monitoring of learning and teaching	• Provide diagnostic recommendations for instructional strategies
	Focused professional development	• Facilitate gathering, analyzing, and synthesizing assessment data to inform professional development • Enhance professional development delivery
Goal 3—All students learn in a safe, civil, healthy, and engaging environment	High levels of collaboration and communication	• Enhance collaboration and communication for students with special needs students and multiple learning styles
	Supportive learning environment	Provide appropriate: • Delivery of learning resources • Delivery of support resources
	High level of family and community involvement	• Enhance family and community outreach strategies to facilitate interaction and meaningful participation

Strategic Goal	Characteristics of High Performing Schools	Educational Technology Contribution
Goal 4—All OSPI staff use integrated, sound management and operational practices to ensure excellence in internal and external customer services	Clear and shared focus	Provide: • School Improvement Planning Tools • Education Profile Web Site • Possible statewide educational portal
	High levels of collaboration and communication	Provide: • Core Student Record System/Data Warehouse/Assessment Information • Certification Project/Professional Growth Plans • OSPI electronic communications and updates
	Curriculum, Instruction and Assessment Aligned with Standards	Provide: • Online Curricular, Instruction, and Assessment Resources • Sharing of exemplary materials developed by fellow educators, peer review opportunities
	Focused Professional Development	Provide: • Technical support and responses to frequently asked questions • Research for educators and educational stakeholders on effective practices • Clearinghouse of professional development opportunities

4.3 INTERDEPENDENT STAKEHOLDERS AND SYSTEMS

Multiple stakeholders are involved in educational technology. The primary stakeholders are:

- *Policy makers*, including state and federal legislators and other policy makers
- *Funders*, including state and federal legislators, philanthropic organizations, and the business community
- *Certification and professional development providers*, including schools of education and in-service and continuing education providers
- *School educational leaders*, including school boards, superintendents, principals, curriculum, instruction, and assessment specialists, and other administrative professionals
- *Teachers*

- *Students*, including special need populations such as special education, bilingual, low income, migrant, and Native American students
- *Network administrators*
- *Parents and community members*
- *Lifelong learning providers*, including community and technical colleges, and universities.

Each stakeholder brings a unique perspective. The educational technology plan recognizes the unique perspectives of multiple stakeholders and their interdependence. For each stakeholder group, the ETAC seeks to convey three fundamental objectives: *Engage, enable, and empower:*

- *Engage* stakeholders in educational technology
- *Enable* stakeholders to adopt appropriate technology suited to their particular needs and strengths
- *Empower* stakeholders with the essential leadership, resources, and encouragement to succeed.

4.4 Teaching Philosophy Matters When it Comes to Educational Technology

Another key concept is teaching philosophy. Teaching philosophy matters when it comes to effective and appropriate educational technology use. The two philosophical poles are "instruction" versus "construction," or, in the case of educational technology, "learning 'from' computers" versus "learning 'with' technology" (Ringstaff and Kelley, 2002). Table 4.2 shows some of the principal differences between a transmission pedagogy (instruction) versus a constructivist (construction) pedagogy.

Table 4.2. Teaching Philosophies

Activity and Roles	Teaching Philosophies	
	Instruction	**Construction**
Classroom activity	Teacher-centered, didactic	Learner-centered, interactive
Teacher role	Fact teller, always expert	Collaborative, sometimes learner
Student role	Listener, always learner	Collaborator, sometimes expert
Instructional emphasis	Facts, memorization	Relationships, inquiry and investigation
Concept of knowledge	Accumulation of facts	Transformation of facts
Demonstration of success	Quantity	Quality of understanding
Assessment	Norm-referenced	Criterion-referenced, portfolios and performance
Technology use	Drill and practice	Communication, collaboration, information access, expression

Source: Sandholtz, Ringstaff, and Dwyer (1997): cited in Ringstaff and Kelley (2002)

Constructivism is a learning theory that claims that understanding "comes from a person's effortful activity to integrate newly communicated claims and ideas with his own prior beliefs and understandings" (Becker, 2000: 11). The two pedagogical underpinnings for a constructivist approach are 1) attending to the "meaningfulness" of instructional support for each student that matches the student's personal experience, and 2) developing a student's capacity to understand a subject deeply enough so the student knows when and how to apply knowledge to a particular circumstance.

Henry Jay Becker's review of the 1998 Teaching, Learning, and Computing (TLC) survey, administered to 4,000 teachers in over 1,100 schools nationwide, showed that there is a strong relationship between teachers' general philosophical viewpoint about what constitutes good teaching and the particular objectives they view as most important in using computers with students. Specifically, Becker's (2000) analysis of the TLC survey found statistical relationships in teachers' responses between philosophical preference (transmission-oriented teaching versus constructivist compatible teaching), objectives for computer use, and the types of software used frequently with students.[14] Computer-using teachers are more likely to have a constructivist philosophy than non-using teachers (Becker, 2000).

While recognizing that no "one size fits all," especially when it comes to teaching philosophy, certain teaching philosophies may enable a more appropriate and effective teaching strategy (or set of strategies) with educational technology. Some researchers express their preference for a constructivist or student-centered approach as "better suited to fully realizing the potential of computer-based technology" (Ringstaff and Kelley, 2002: 2; see also Becker, 2000; Becker, 1999).

Other researchers take a more embracing perspective. The Metiri Group developed a "range of use" chart to "help educators 'see' that:

- instructional approach, level of challenge, and authenticity matter
- low performing students don't have to be relegated to drill and practice, or integrated learning systems, but can learn the basics as they engage across a range of uses
- all uses are valide [sic] provided they truly meet learners' needs."[15]

Certain instructional approaches to learning may better lend themselves to educational technology applications than others. On one end of the spectrum, a didactic learning approach may favor drill and practice so elementary students can learn computer basics. A middle ground approach may entail coaching students through appropriate computer-based applications. Finally, a constructivist learning approach may emphasize higher order thinking skills at the high school level, for instance, problem solving with real data sets on the Internet.

To summarize, instead of asking what kind of educational technology a teacher requires, the question might be more appropriately framed as, *"What is the school's teaching philosophy and how can educational technology most effectively address students' needs within that philosophical framework?"*

5.0 State of the State

This section discusses the state of educational technology in Washington State, including statewide technology dissemination since education reform was initiated in Washington State, district initiatives, regional and statewide initiatives, and activities underway at the state level by OSPI and the Governor. Funding is derived from a variety of local, state, federal, and private sources.

5.1 Washington State Has Multiple Educational Technology Initiatives Underway

Multiple educational technology activities are underway and under development throughout Washington State at the school building, district, regional, state, and federal levels. Many of these efforts involve public and private partnerships.

Multiple stakeholders are involved in various educational technology initiatives. Although an exhaustive program listing is beyond the scope of the educational technology plan (but *is* considered a critical ongoing recommendation), the initiatives described here provide a sense of the depth, breadth, and heterogeneous nature of educational technology initiatives currently underway in Washington State. Appendix E, Educational Technology Initiatives, provides an overview of the initiatives. Appendix B, Bibliography, provides additional information on program sponsorship and specific activities. Individual initiatives vary greatly in terms of:

- Program scope
- Program content, e.g., math skills development versus assistive technology applications for disabled students
- Targeted populations (primarily teachers and students, but also involving network administrators, school educational leaders, policy makers, and researchers)
- Overall funding, funding methods, and funding support over time
- Implementation timeframe
- Specific technology applications.

This high degree of variability highlights the need for a dynamic statewide process to capture the current status of educational technology initiatives so that schools, policy makers, and other stakeholders can assess progress effectively.

Another issue is the degree of overlap and unique features of individual initiatives. As shown in Table 5.1, four categories are used to disaggregate somewhat the various program initiatives:

1. *Learning and Teaching Initiatives*—these initiatives include teacher and student applications, Internet and other educational technology resources, and program content and delivery strategies.
2. *Professional Development to Support Technology Integration into Curriculum and Instruction*—a particular focus is on teacher professional development strategies to infuse educational technology into curriculum and instructional practice
3. *Networking and Connectivity*—primarily focuses on describing the current status of the K-20 Educational Telecommunications Network
4. *Technology Support for Education Reform*—describes not so much the application of educational technology *per se*, but instead focuses on how technology is being applied to address education reform objectives statewide through classroom, district, regional, and statewide school improvement planning tools, assessment tools, and Web-based information relating to Washington's education reform efforts.

Generally, the initiatives described have statewide applicability, are supported through dedicated funding at the state, federal, or foundation level, have been implemented for a minimum of two years, or, if not yet implemented (as in the case of Governor Locke's Digital Learning Commons initiative), would span a multi-year period.

Table 5.1. Educational Technology Initiatives in Washington State

Initiative	Short Description	Sponsors				
		School Districts, ESDs	State	Federal	Private	Other Partnerships
LEARNING AND TEACHING INITIATIVES						
Assistive Technology Projects	Includes the SRVOP Project for deaf children, their families and educators, the Learning Disabilities and Technology Project, and the Washington Assistive Technology Alliance	✓				✓
Class Tools for Washington Teachers and Students	Provides ready-made lesson plans that meet The College Board guidelines and additional resources		✓		✓	
Digital Learning Commons	Web-based portal where students and teachers have access to high quality digital resources, teaching and learning tools, and online courses		✓	✓	✓	
Generation www.y Project	Students collaborate with teachers in restructuring education through educational technology			✓	✓	
High Tech Learning Centers	Information technology (IT) education leading to industry certification and/or higher education	✓				
MarcoPolo Online Resources	Internet content developed by experts for K-12 classroom applications	✓	✓		✓	
NO LIMIT Project	Improve math skills through technology integration			✓		
Online Buying Cooperatives	Product purchases through ETSC program	✓	✓			
Online Courses	Online courses offered through secondary schools	✓				
Online Schools in Washington	Online schools that provide comprehensive core and elective course program offerings	✓				
Pacific Lighthouse	Digital repository project					✓

Initiative	Short Description	Sponsors				
		School Districts, ESDs	State	Federal	Private	Other Partnerships
ProQuest Online Database	Access to over 3,000 magazine titles and various newspapers and databases				✓	
SHARE Project	Multiple schools involved with ESD 105 in providing online communication, newsletters, research, Web-page development, publication of student work, project-based curriculum	✓				
TIP 21 Project	Student projects, tele-collaborative projects, staff development, resources	✓		✓		
Using Digital Tools Project	Online curriculum and student resources	✓		✓		
UW Distance Learning Courses	Distance education to provide college-level courses for K-12 students, and related online course development		✓			✓
Washington State LASER	K-8 science education reform initiative	✓		✓		✓
PROFESSIONAL DEVELOPMENT TO SUPPORT TECHNOLOGY INTEGRATION						
ETSC program	Support OSPI-directed technology initiatives; Collaboration; Professional development; Information dissemination; Support regional technology leadership; Communication.	✓	✓			
Intel Teach to the Future	Educational technology professional development				✓	
Learning Space	Provide educators with opportunities and tools to develop, implement and share effective uses of technology to improve student learning					✓
PILOT Tool	Professional development, assessment, information sharing	✓	✓			

Initiative	Short Description	Sponsors				
		School Districts, ESDs	State	Federal	Private	Other Partnerships
Smart Tools Academy	Educational technology professional development--School Educational Leaders				✓	
Teacher Leadership Project	Teacher training program for educational technology integration				✓	
Tech Corps Washington	Provides technology volunteers in schools, offering tech support and teacher training				✓	✓
NETWORKING AND CONNECTIVITY						
The K-20 Network	High-speed educational telecommunications network		✓			
Internet 2 ("Abilene")	Next generation Internet					✓
TECHNOLOGY SUPPORT FOR EDUCATION REFORM						
Education Profile System	Online application for researching and evaluating education data, including demographic and test score information		✓			
Online Statewide Educational Standards	Essential Academic Learning Standards (EALRs) and Washington Assessment of Student Learning (WASL) online		✓			
School Improvement Planning Process	Collect and analyze data to determine the effectiveness of school programs and services		✓			

Note: Initiatives listed in alphabetical order.

5.2 EDUCATIONAL TECHNOLOGY FUNDING IS DERIVED FROM MULTIPLE SOURCES

This section provides a review of funding for educational technology along with recent (2002-03) state and federal allocations earmarked specifically for educational technology purposes. Although there are no comprehensive statewide data on funding sources and total expenditures for educational technology in Washington State, survey findings from the Technology Alliance and OSPI provide some measures on funding practices and overall expenditures.

Overview of Educational Technology Funding

The tremendous advancement in educational technology from 1994 to present is no doubt due to funding from a variety of public and private resources.

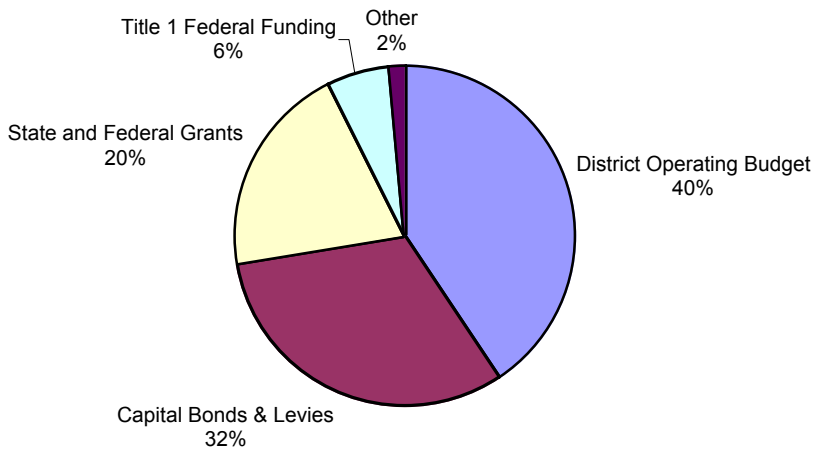
In a survey conducted by the Technology Alliance (1998), districts reported that educational technology funding was derived from several local, state, and federal sources (*Figure 5.1*).

In 2000, per-pupil spending on educational technology in Washington State averaged $120, down slightly from $133 in 1998. There is a very wide range in the per-pupil amount, from $8 per pupil to $667 per pupil. District operating budgets provide the largest single source of funding for educational technology, followed by bonds and levies. Districts with higher per-pupil property assessments continue to be more likely to spend more per student than those with lower per-pupil property assessments (Friedman and Erickson, 2000).

Overall, about one in four districts (28 percent) considered less than half of their funding to be secure. On the other hand, 32 percent of districts considered most of their funding to be secure, a significant improvement since 1998 (Friedman and Erickson, 2000).

In terms of district spending priorities, national data suggest that funding for professional development should be a priority yet most funding is devoted to hardware (67 percent) and software (20 percent), with about 14 percent going to staff development (Education Week, 2002). Educational technology experts suggest the opposite: “Organizations should spend 30 percent of their technology budget on equipment and 70 percent on the ‘human infrastructure’ to support ongoing training and technical assistance” (White, Ringstaff, and Kelley, 2002: 5).

Figure 5.1. School Educational Technology Funding Sources



Source: Technology Alliance (1998). Based on a fax-back survey to Washington's 296 school districts. 227 districts responded, a response rate of 78 percent representing 82 percent of total state enrollment.

Local Funding for Educational Technology

Local funding, including capital bonds and levies, is the second largest source of educational technology funding.

Bonds and Levies

Article 7 of the State Constitution and chapter 84.52 RCW give school districts authority to levy property taxes. There are four types of levies:

1) Excess general fund levies,

2) Debt service fund levies

3) Transportation vehicle fund levies

4) Capital project fund levies.

The voters of the school district must approve such levies by a 60 percent "Yes" vote in a district-wide election. School districts may run a levy for a particular fund only two times in a calendar year. Unsuccessful levies may be resubmitted in subsequent years (Bigelow, Jones, and Stead, 2002).

Excess general fund levies are used for day-to-day operations of the schools, commonly known as school district maintenance and operation (M&O) levies. M&O levies can be used to

pay for training, to finance the purchase of instructional materials including software and other computer-related materials, and to replace equipment including hardware (Technology Alliance, 1998). The majority of local funding for school district maintenance and operations (M&O) is derived from local tax levies. Statewide, local sources provided over 19 percent of school district revenues in the 2000-01 school year, with levy proceeds comprising most of this funding (Bigelow, Jones, and Stead, 2002).

The major source of support for acquiring educational technology for the classroom, besides reprioritizing within general apportionment, has been the local special property tax levy (special levy). School districts are authorized to propose to local voters special levies for maintenance and operations purposes, capital projects, or other more specific purposes. Both maintenance and operations and capital projects special levies may be used by a school district to meet its needs for digital technology. In fact, a number of school districts have gone to their voters and received permission to collect additional revenues solely to support additional technology. This practice has led to a disparity among school districts in acquiring digital technology based on the willingness of the local taxpayers to approve special levies and the availability of private funds.

In addition to M&O levies, districts have the authority to raise levies for debt service, capital projects, and transportation needs. Other local revenue is derived from timber excise tax, school lunches, investment earnings, various fees, interdistrict cooperatives, grants, and donations.

Capital levies can be used to pay for school construction or remodeling. Computers are considered to be a type of equipment and computer acquisition is permissible. However, such bond proceeds may not be used to replace equipment. Two- to six-year capital levies may be used to buy computers apart from a construction project if the acquisition is part of a system upgrade. Library, text, and reference books in digital format may be purchased as part of a construction project. Capital levies may also be used to finance the modernization of a computer system or facility (Technology Alliance, 1998).

The supermajority requirement of 60 percent further limits the ability of districts to raise revenues for educational technology initiatives. In 2001, 275 of the state's 296 school districts passed General Fund M&O levies. The average revenue per Full Time Equivalent (FTE) student statewide was $1,105. Seventeen districts did not submit a levy. Four districts attempted levies for 2001 but failed to gain voter approval (Bigelow, Jones, and Stead, 2002).

Capital bonds and levies provide a significant source of funding for school district educational technology efforts; however, capital bonds and levy funding may be regarded as unstable and limited in terms of what type of educational technology efforts may be pursued.

Capital bonds and levies have other major limitations as funding sources since legal opinions and school district interpretations of state laws have tended to limit these expenditures to initial hardware purchases, or to hardware bundled with pre-installed software. This often means that important needs such as staff development, maintenance and technical support are inadequately funded, leading to ineffective use of the technology or computers sitting unused. Many school districts in economically depressed regions are not able to get voter approval for local bonds and levies. Therefore, there tends to be educational technology inequities between districts in technology expenditures, and consequently in the quality and quantity of technology programs available for instructional purposes.

At the policy level, persistent differences between high valuation and low valuation districts may create educational technology adequacy and equity issues, especially as poorer districts try to play "catch-up" with their more affluent counterparts. The Technology Alliance 1998 survey and a follow-up survey in 2000 found a positive correlation between district property values and technology spending per pupil and a negative correlation between student participation in the free and reduced-price lunch program and technology spending. That is, wealthier districts and those with fewer children in the free and reduced-price lunch program tend to spend more on average for educational technology (Technology Alliance, 1998; Friedman and Erickson, 2000).

State Funding for Educational Technology

Washington State has a long history of supporting educational technology, including:

- In-service training for educational technology instruction
- Ongoing support for Educational Service District educational technology programs through the Educational Technology Support Centers
- Equipment purchases
- Educational technology grants to improve educator professional development and student achievement.

During the 2001-2003 biennium, the state continued to provide funding to support educational technology in K-12 schools. The legislature provided monies for the on-going support of the K-20 Network, which connects school districts, educational service districts (ESDs), community colleges, and the four-year colleges and universities to one another and the Internet. By December 1999, all ESDs, 294 school districts, the schools for the deaf and blind students, and OSPI were connected to the network. Currently 95 percent of K-12 classrooms in Washington state have access to the Internet via the K-20 Network.

The monies provided for the on-going support of the K-20 Network included $4.0 million to fund the Regional Institutional Technical Units at the nine ESDs, which provide technical support specifically for K-12 schools. It also included $5.7 million for K-12 transport and maintenance costs not covered by participant co-payments, as well as funding for the KOCO network operations that jointly support all of the K-20 Network.

The Legislature has also provided $4.05 million biennially for the Educational Technology Support Center (ETSC) Program, the Educational Technology Development Center, and OSPI staff to provide statewide leadership in technology.

Currently there is no dedicated funding source for educational technology, i.e., through a state revolving fund dedicated to educational technology or through a formula-driven apportionment process. Consequently, continued funding for educational technology at the state level relies on biennial and supplemental appropriations, creating challenges for effective long-range planning.

Federal Funding for Educational Technology

While the federal government's share of seven percent of overall education funding is relatively small, its share of educational technology funding is substantial, accounting for 25 percent to 35 percent of all annual K-12 technology funding, depending on the state. By fiscal year 2001, U.S. Department of Education funding had risen to $872 million compared to $23 million in 1993. Federal funding has been used to purchase computers and software, train teachers, and revise curriculum, instruction, and assessment practices (Wilhelm, Carmen, and Reynolds, 2002).

Enhancing Education Through Technology is the primary source of federal educational technology funding under the Elementary and Secondary Education Act (ESEA). The program consolidates the Technology Literacy Challenge Fund (TLCF) and Technology Innovation Challenge Grant Programs into a single State formula grant program. As shown in Table 5.2, a total of just over $8.3 million was allocated to Washington State for fiscal year 2002-03, with 5 percent ($415,000) allocated to OSPI for program administration and technical assistance. The remainder was divided evenly between competitive grants and flow-through funds to districts (as required by the legislation), with $3,960,696 each in competitive grants and flow-through dollars.

Table 5.2. Enhancing Education Through Technology (EETT) (Title II, Part D) Funding for Washington State 2002-03

Item	Amount	Notes
Administration	$415,000 (5 percent)	$265,000—Technical Assistance, Program Administration $25,000—Blackboard licenses and support $25,000—Web site support $100,000—Development of student and teacher technology competencies and performance assessments
Flow-Through to School Districts (formula driven)	$3,950,000 (47.5 percent)	Distributed via WebApps/iGrants grant system Based on Title I allocation percentages for each district Average of about $4.00 per student Districts may transfer up to 50 percent of funds to Title I or other programs as long as funding is used to improve learning with educational technology Requirements: • For improving student achievement through the use of technology • For improving student achievement through use of technology • Must spend at least 25 percent on professional development on integrating technology into curriculum Deliverables: • Improved student technology literacy • Improved teacher quality in infusing technology into curriculum
Competitive Grants to School Districts	$3,950,000 (47.5 percent)	All devoted to Year 2 of "No LIMIT" Project, in partnership with all nine ESDs and the Special Education Technology Center in Ellensburg (Appendix E provides additional information on the No LIMIT Project) Awarded in 2001-02 to 224 grade 6-7 math classrooms in 56 school districts to improve learning through infusion of technology in mathematics Coordinated with Dennis Small and ETSC Program/ETDC, Bob McIntosh and Middle School Math Leadership Group Evaluation over 2 years by Western Washington University for all participants in a statewide, comprehensive approach
TOTAL	**$8,315,000**	

Other Funding Sources

Funding provided by other sources is small (estimated at less than two percent of total educational technology funding). However, these resources provide essential services and they perform roles that might not otherwise be supported.

Other funding sources include philanthropic sources (private organizations), public-private partnerships, and individual donations or in-kind community support. The support can include direct financial assistance to individual school districts or hosting a technical assistance Web site or professional development training venue. Appendix E provides a review of such initiatives. Many of these initiatives highlight innovative and targeted approaches to infusing educational technology into curriculum, instruction, and assessment practices, professional development, network support, and educational leadership. Standard-setting bodies such as the International Society for Technology in Education (ISTE) have taken on a leadership role in developing educational technology standards for teachers, students, and administrators. Private and non-profit foundations supported by the Bill & Melinda Gates Foundation, Intel, Apple, the Learning Space, and others have provided targeted support to high-need schools and have identified policy issues for legislative consideration.

6.0 Gap Analysis

The gap analysis presented in this section provides several comparisons of Washington's educational technology efforts:

- How Washington compares with other states
- How Washington compares against some of its own benchmarks relative to educational technology
- What the significant shortfalls are based on the national literature and concurrent trends in Washington State
- Specific issue areas such as students with special needs and educational technology equity between districts
- Summary of major trend lines and projections.

The analysis provides strong support for the recommendations and priority action items developed by the Educational Technology Advisory Committee and described in Section 7.

6.1 OVERVIEW OF WASHINGTON'S EDUCATIONAL TECHNOLOGY PROGRESS

How does educational technology contribute to, strengthen, and refine Washington's educational reform efforts? This was the genesis for the educational technology plan in 1994 and is the same question that policy makers and educators are asking today. By some accounts, the achievements are significant.

Computers are better, faster, cheaper, and more plentiful. Educational software is more robust and plentiful. The Internet—a tool used mainly by researchers and government agencies in 1994—today hosts a variety of curriculum, instruction, and assessment offerings for educators and students at school and at home. Educational technology provides professional development, administrative, and distance learning opportunities. Alternative media—including videoconferencing, personal digital assistants, and telecommunications devices—are a reality for many schools. And the K-20 network provides a reliable network for providing high-speed telecommunications to 430 public education sites statewide.

Educational technology has increased substantially since 1994 when Washington's first educational technology plan was adopted. In this eight year period Washington State has made significant progress on almost every measure of educational technology, including technology availability at schools, use of educational technology in instructional settings, ratio of computers to students, and availability of educational technology outside of the schools at students' homes

and in the broader community. Washington State more or less reflects these trends, as described below.

Yet persistent issues remain nationally and in Washington State, including:

- Gaps in access and use of educational technology between minority and poor students and their counterparts
- Limited infusion of educational technology into curriculum, instruction, and assessment practices
- Lack of standards guiding educational leaders, educators, and students in the appropriate and effective use of technology
- Lack of consolidated, sustained funding to support educational technology applications
- Lack of research and demonstrated practices that assist educational leaders in finding the most efficient ways to infuse educational technology into their specific programs
- Policies and practices that hinder students in making full use of educational technology, even when it is available and accessible
- Too much reliance on hardware allocations at the cost of professional development and network staffing support.

National trends in educational technology are described below, followed by a closer examination of educational technology in Washington's schools.

6.2 Significant Growth in the Rise and Use of Educational Technology 1994 to 2002

Across schools in the United States the availability of technology for instructional purposes has increased tremendously. In 2000, four in five students (about 80 percent) reported using computers at school (Newberger, 2001). Although gaps persist between those who have access to educational technology, the period between the first educational technology plan in 1994 and today is striking in many respects, most notably in the widespread dissemination of educational technology networks, hardware, and increasing computing speed and diverse applications. At the same time, the ability to harness educational technology effectively, efficiently, and appropriately in classroom and other instructional settings raises continuing challenges and unresolved issues.

There are many discrete types of educational technology and associated applications such as the Internet, handheld devices, computers and associated software systems. This

section first discusses Internet access due to its widespread adoption and application in multiple learning activities and its incorporation of a wide variety of educational technologies such as electronic mail, videoconferencing, and distance learning.

Internet Access at School is Widespread

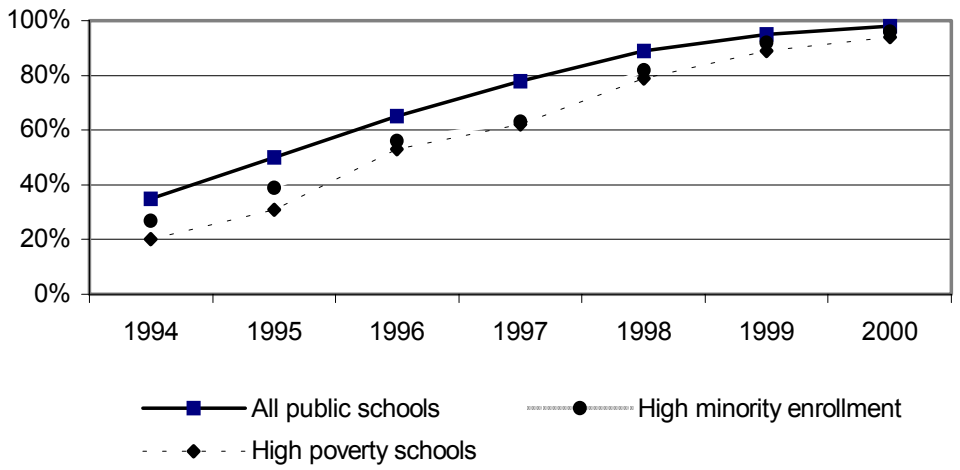
By fall of 2000, 98 percent of all schools were connected to the Internet, compared with 35 percent in 1994 (*Figure 6.1*), with "some sort of access to the Internet, someplace in their building."[16] This is attributed in part to the Education rate (E-rate) program to make services, Internet access, and internal connections available to schools and libraries at discounted rates based on student income and school location (urban or rural). As of February 28, 2001, $5.8 billion had been committed to E-rate applicants (Cattagni and Farris, 2001). A key measure related to this overall measure of connectivity is the proportion of instructional rooms connected to the Internet, that is, classrooms, computer and other labs, library/media centers, and other rooms used for instructional purposes. By fall of 2000, three out of four instructional rooms (77 percent) were connected to the Internet.

The significant increase in Internet access may have been aided by the Education rate (E-rate) program. The E-rate program was established in 1996 to make services, Internet access, and internal connections available to schools based on student income and rural or urban location (Cattagni and Farris,, 2001).

By the fall of 2000, the ratio of students to instructional computers in public schools had decreased to 5 to 1. The ratio of students to instructional computers *with Internet access* was 7 to 1 in 2000. Many experts consider a five to one ratio of students to instructional computers to be a useful general benchmark for effective use of educational technology (Cattagni and Farris, 2001; Becker, 2000; Statham and Torell, 1999, cited in Ringstaff and Kelley, 2002). As of 2001, there were, on average, 6.8 Internet-connected students per computers (instructional and non-instructional) and 4.2 students per instructional computer (Education Week, 2002).

Changes have also taken place in the types of network connections and the speed at which they are connected to the Internet. Not surprisingly, connections are more frequently dedicated-line Internet connections and they provide faster and more reliable access (Cattagni and Farris, 2001).

Figure 6.1. Percent of Public Schools with Internet Access, by School Characteristics: 1994-2000



Note:

High minority enrollment = 50 percent of more of student population.

High poverty schools = 75 percent or more of students eligible for free or reduced-price school lunch

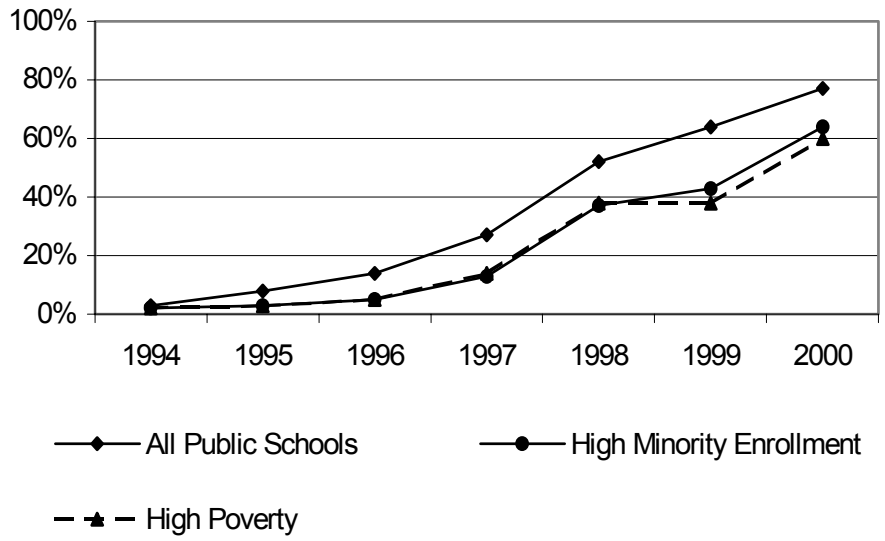
Source: Cattagni and Farris, 2001

Challenges Remain for Special Populations

Although the gap between low income and high minority schools and their counterparts has diminished significantly in terms of instructional computers and Internet accessibility, differences still exist. In schools with the highest concentration of students in poverty (75 percent or more eligible for free or reduced-price lunch), a smaller percentage of instructional rooms were connected to the Internet. Less access to instructional computers is also evident in schools with high minority enrollments.

Overall, however, schools with the highest concentration of poverty and high minority enrollments showed significant gains from 1999 to 2000 (*Figure 6.2*). In this one year period the percent of instructional rooms with Internet access increased from 38 to 60 percent in schools with high poverty, and from 43 to 64 percent in schools with high minority enrollment (Smerdon, et al., 2000; Cattagni and Farris, 2001).

Figure 6.2. Percent of Instructional Rooms with Internet Access in Public Schools, By School Characteristics: 1994-2000



Note:

High minority enrollment = 50 percent of more of student population.

High poverty schools = 75 percent or more of students eligible for free or reduced-price school lunch

Source: Cattagni and Farris, 2001

Internet Access After Class and At Home

In 2000, over half of public schools offered computers with Internet access to students outside of regulator school hours. Secondary schools were more likely to make the Internet available to students outside or regular school hours than elementary schools (80 percent compared to 46 percent), as were larger schools. Large, secondary schools are thus most likely to offer the use of after-school computers with Internet access. Of the schools making the Internet available to students outside of regular schools hours, almost all (98 percent) made it available after school, 84 percent made it available before school, and 16 percent made it available on weekends (Cattagni and Farris, 2001).

More children have access to a computer or use the Internet at home. By August 2000, 54 million households in the United States, about one out of every two households (51 percent), had one or more computers. Of these, 44 million households (42 percent of all households) had Internet access. In comparison, about in four households had a computer in 1993. In 1997, the first year in which the Census Bureau collected information on Internet use, one in five households had Internet access (18 percent) (Newberger, 2001).

Nearly two out of every three children has access to a computer at home. Older children are more likely to use the computer at home. White non-Hispanics and Asians and Pacific Islanders are most likely to have a computer at home. Not surprisingly, high-income households are more likely to have computers or Internet access. Almost all (95 percent) of children in high-income households earning $75,000 or more per year had a computer at home. Only one in three children in low-income households earning $15,000 or less per year had a computer at home. Furthermore, compared to their wealthier counterparts, low-income children are more likely to use computers for games rather than for schoolwork, word processing, and other software applications (Becker, H., cited in Wilhelm, Carmen, and Reynolds, 2001).

School has the potential to be the great equalizer in terms of computer and Internet access. For children 6 to 17 years old, computer use at school is more nearly equal across income, race, and ethnicity than computer access at home (Newberger, 2001). Yet although the gap in access both at home and at school has declined, high poverty and high minority school children are less likely to have dedicated Internet access at home or at school (Newberger, 2001; Cattagni and Harris, 2001). Continuing disparities in educational technology access raises concerns about disproportionate access for children at risk who have the highest need for educational technology. For instance, Project TELL, a long-running demonstration project in New York City, found at-risk youth with access to home computers and network availability in an online learning community scored substantially higher than their control group peers on standardized reading and math tests (Kornblum, W., 1998; cited in Wilhelm, Carmen, and Reynolds, 2002). Consequently, while the gap is narrowing, a gap nevertheless remains in access to educational technology.

Internet Applications

How the Internet is used, rather than simply having access, is of interest to policy makers and to educators alike.

Student Use of the Internet

The most frequently cites uses of the Internet by children at home are e-mail, school research or courses, information searches, and checking news, weather, and sports (Newberger, 2001). Students rely on the Internet to help them do their schoolwork and use the Internet for multiple education-related activities. Five metaphors of Internet use have been identified through student focus groups (Levin and Arafeh, 2002):

- “Virtual textbook and reference library”—a place to find primary and secondary source material

- "Virtual tutor and study shortcut"—a place to receive instruction about material that is interesting or confusing, or as a way to complete schoolwork as quickly and painlessly as possible, and for some, using the Internet to plagiarize material or otherwise cheat

- "Virtual study group"—a collaboration tool with other students

- "Virtual guidance counselor"—a place to seek guidance relating to school, careers, and post-secondary education

- "Virtual locker, backpack, and notebook"—a place to store important school-related materials and to transport books and papers, and a place to keep track of class schedules, syllabi, assignments, notes, and papers.

Teacher and Professional Use of the Internet

Most teachers (68 percent) report making some use of the Internet in their professional activities. Almost half of teachers use the Internet weekly or more frequently. (Becker, 1999). Teachers most frequently use the Internet for information searches, teacher research, lesson planning, demonstrations and presentations (National School Boards Foundation, 2002). Teachers use information from the Internet at home and at school on an equal basis. Overall, the three most important variables in predicting teachers' Internet use is (Becker, 1999):

- The teacher's level of classroom connectivity—high speed Internet classroom connectivity is one of the strongest predictors of teacher's Internet use

- Teacher computer expertise—"Although the Internet is often presented as a novice-friendly area of computer use…relevant prior computer knowledge may be an important pre-requisite for a teacher to make the Internet a valued resource in their classroom, and valuable in their lesson preparation activities in particular" (Becker, 1999: 29)

- Teacher pedagogical beliefs and practices—Teachers who regard education as primarily the distribution of facts and skills to students are much less likely than their "constructivist" counterparts to use the Internet.

Internet Use Policies

A major concern of parents, school educational leaders, and policy makers is student access to inappropriate Internet material. In 2000 almost all public schools with Internet access (98 percent) had "acceptable use policies" (AUPs) and used various technologies or procedures to limit inappropriate use of the Internet. These technologies or procedures included blocking or filtering software, an intranet system, honor codes for students, or teacher and staff monitoring to control student access to inappropriate material on the Internet (Cattagni and Farris, 2001).

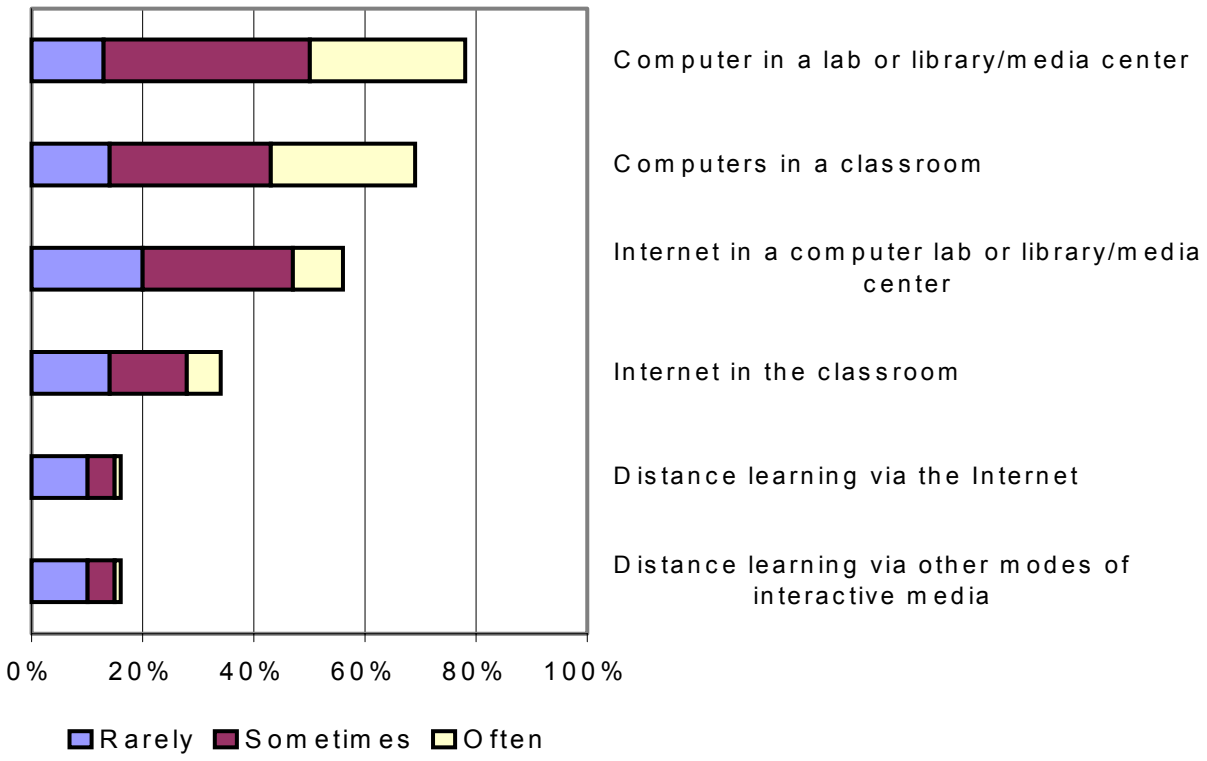
The federal Children's Internet Protection Act (CIPA) requires districts that use E-rate funds to put "technology protection measures" into place that guard against student access to obscene materials, child pornography, and other online content that is harmful to minors. However, several issues have been raised concerning Internet use policies (Willard, 2002, Borja, 2002):

- Over-reliance on blocking technologies and other AUPs may fail to ensure that the Internet is used for high-quality educational purposes; students may simply use the Internet instead for music, games, chat rooms, and other non-instructional uses
- Relying on third-party vendors to establish blocking protocols may relegate key acceptable use policymaking to private vendors rather than school officials, potentially creating biased or inappropriate restrictions
- Failing to instruct students and inform parents on acceptable uses of the Internet or overly relying on blocking and filtering software to the exclusion of teaching responsible use and supervising students appropriately may lead to a "false sense of security" concerning Internet use.

Other Educational Technology Applications

Figure 6.3 provides a snapshot of public school teachers reporting the use of various technologies in schools and classrooms. Teachers most frequently cited computers in a lab or library/media center (78 percent), followed by classroom computers (69 percent), use of the Internet in a computer lab or library/media center (55 percent), Internet in the classroom (34 percent), and, finally, distance learning (16 percent).

Figure 6.3. Percent of Public School Teachers Reporting Student Use of Various Technologies in Schools and Classrooms: 1999



Source: Smerdon, et al. (2000)

6.3 EDUCATIONAL TECHNOLOGY ISSUES

In critical respects educational technology use is surprisingly limited. Data from *Technology Counts*, Education Week's annual review of educational technology, suggests that, "apart from the increased use of the Internet, general use of computers in the classroom appears to be stagnant" (Education Week, 2002: 56). Over a five-year period, the level of computer use in fourth and eighth grade remained unchanged.[17] The Education Week survey also indicates that teachers who did use computers in class used them most often for traditional drill-and-practice activities or math games. Tasks promoting higher thinking skills were used much less frequently.

Barriers to Teacher Use of Educational Technology

Despite significant gains in the overall amount of educational technology, barriers to educational technology present significant challenges. Teachers report several issues that present barriers to their use of educational technology, including (Smerdon, et al., 2000):

- Lack of release time for professional development on how to use computers and the internet

- Lack of time set aside in the school schedule for students to use computers in class
- Insufficient numbers of computers
- Lack of good instructional software
- Difficult Internet access.

Related problems include obsolete or poorly equipped machines (some over ten years old), wide discrepancies in educational technology accessibility from state to state and from school to school, and persistent gaps in educational technology accessibility in high poverty and high minority schools (Ringstaff and Kelley, 2002; Wilhelm, Carmen, and Reynolds, 2002).

How instructional computers are deployed within a school is another consideration. Class scheduling, pressure of curriculum coverage, classroom access to computer clusters, teacher skill and expertise in using computers, and teacher philosophy and objectives for computer use have been correlated with the successful application of instructional computers. Barriers to using computers include classes that are too large, accountability for teaching a specific curriculum that inhibits use of educational technology, unreliable and complicated computer systems and unwanted technology or technology that a teacher did not request (Becker, 2000).

Educational Leadership Makes a Difference

In addition to teacher attitudes about and use of educational technology, educational leaders and the policies they adopt can affect the ways in which students and teachers apply educational technology. In a qualitative survey of student perceptions about the Internet, students reported that administrative decisions affected levels of access to the Internet, requirements for technology literacy skills, and the amount of restrictions on student Internet access. Students also reported that, even in well connected schools, wide variation in teaching policies about Internet use in class frequently inhibits engaging curriculum and instruction with online resources. In fact, as the researchers noted, “Students repeatedly told us that the quality of their Internet-based assignments was poor and uninspiring. They want to be assigned more—and more engaging—Internet activities that are relevant to their lives. Indeed, many students assert that this would significantly improve their attitude toward school and learning” (Levin and Arafeh, 2002: iv). Other roadblocks cited by students include (Levin and Arafeh, 2002):

- Poor quality of Internet access, often limited to certain places or certain times in school with restrictive use policies
- Blocking and filtering software creates barriers to legitimate educational use of the Internet

- Teachers do not assign homework requiring the use of the Internet out of concern for students without access at home.

In the Apple Classrooms of Tomorrow Project (ACOT), professional development allowed participants to see expert teachers modeling instructional use of technology as they worked with students. Evaluation of the program found that principal and administrative support was critical to project success. Specifically, principals needed to provide time for participating teachers to plan and reflect together on their practices, recognize teacher efforts, and ensure that teachers had the authority and flexibility to adjust their instructional schedule and develop curriculum objectives promoting team teaching and interdisciplinary instruction (Ringstaff and Kelley, 2002).

6.4 Snapshot of Educational Technology in Washington Schools 1993-2002

State trends in educational technology match those at the national level in many respects. Based on surveys and inventories that OSPI has conducted since 1992, there has been tremendous change in both the amount of technology and its use in K-12 schools in Washington State. These changes have often accompanied by an increase in complexity, leading to greater support and training requirements. In addition, networked technology has shifted from a supplemental resource to a "mission-critical" role in a number of districts, both instructionally and administratively.

In several important respects, the barriers to effective educational technology found in national studies are also evident in Washington State.

Connectivity and Internet Access in Washington Schools

Almost all schools are connected to the Internet and have integrated networks. Fully 99 percent of the instructional buildings in Washington State can now access the Internet, compared to 32 percent in 1994 (the earliest survey data for Washington State on this item). Consistent with this finding, 95 percent of K-12 instructional classrooms can now access the Internet from one or more computers in their classroom, a tremendous increase from only 4 percent in 1994. Over 96 percent of the instructional buildings in Washington State have a building-wide Local Area Network (LAN), compared to less than one-third in 1993.

Experts have suggested that a 1:5 computer-to-student ratio would provide a sufficient level of access. However, there are significant variations in the ways in which computers are disseminated in schools, whether computer labs are used, and which grade levels have access to computers. Classroom-based computers with Internet access have been associated with whether teachers use the Internet for student research (Becker, 2000; Ringstaff and Kelley, 2002).

Consequently, this is a singularly important indicator of educational technology adoption in Washington's schools.

Based on this and related measures, *overall* Washington appears to closely meet the general standard of one computer for five students (*Figure 6.4*). Many classrooms, however, may fail to reach this desired ratio.

As reported by the Technology Alliance in a 2000 survey of school districts in Washington State (Friedman and Erickson. 2000), there was approximately one computer for every five students, and one "networkable" computer for every thirteen students. OSPI reported in its 2000-2001 survey that the statewide average is one computer for every four students. Approximately 260,000 computers (of all types) are used instructionally in K-12 schools, with a student to computer ratio of just under 4:1, compared to 6.4:1 in 1994 and 9.2:1 in 1992.

The Technology Alliance's 2000 survey provides further support that computers are making their way into Washington State classroom instructional settings (Friedman and Erickson, 2000). Based on their survey results, they estimated a computer-classroom ratio of 6:1 in high school, 5.2:1 in junior high schools, and 4.9:1 in elementary classrooms. It is not clear from these data how many are networked, connected to the Internet, and meet the minimum performance standards as defined by OSPI. OSPI reported in its 2001 survey that less than 57 percent of the instructional computers in use met the minimum statewide standards recommended by OSPI. The student to computer ratio for "standards-based computers" is less than 7:1, higher than the average recommended ratio of five students per computer.

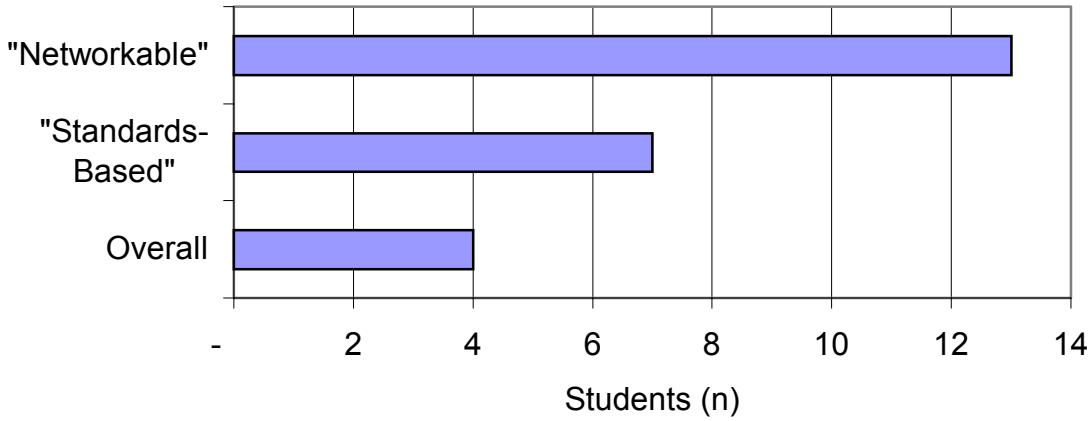
Communication and Connectivity

Nearly all of the approximately 55,000 K-12 certified staff had e-mail accounts provided by their school district. Over 75,000 students (about 8 percent) of students have district-provided e-mail accounts. In 1993 less than one-third of teachers had e-mail accounts and student accounts were largely non-existent.

Over 900 of the state's 2,000-plus school buildings have T-1 or higher access to the Internet, with most of the remaining buildings having lower-speed connections ranging from 56K to 786K. About $3 million in federal Emergency School Repair and Renovation Grants has just been awarded to help wire 80 Washington school buildings that still lack K-20 connectivity during 2002 and 2003.

Based on United States census data, Washington State ranks fourth nationwide in the percent of children having home Internet access. More than half (60 percent) of Washington households with children ages 3-17 have Internet access at home. Nationwide, the percent of school-age children with home Internet access ranges from 69 percent (New Hampshire) to 31 percent (Mississippi) (Wilhelm, Carmen, and Reynolds, 2002).

Figure 6.4. Selected Student-Computer Ratios



Note:
"Standards-based" computer defined as Pentium PC 133 MHz or higher, Power Mac 4400 or higher, Mac G3, Mac G4, or iMac.

Source: Friedman and Erickson (2000); Office of Superintendent of Public Instruction (2001).

Network Support

Related to the issue of older or obsolescent technology is lack of network support. Teachers report that a major barrier to effective integration of educational technology into their instructional practices is due to lack of adequate support, unreliable networks and computers, or insufficient skill to operate a computer (Becker, 2000; Smerdon, et al., 2001). In the Technology Alliance survey, almost one out of five schools (18 percent) reported that they had no official technology plan and used ad hoc support (including teachers working on their own time) to install and operate computers and other technologies. In many schools, small technology departments struggle to assist multiple schools, and no schools reported a level of 1 Full Time Equivalent (FTE) technology coordinator per school (Friedman and Erickson, 2000). OSPI's 2001 survey found that two-thirds (67 percent) of Washington's school buildings have paid technology support, averaging 3.4 hours per day.

Lack of technology support is due to very high computer-to-technician staffing ratios in schools, periodic shortages of network administrators due to market competition, and restrictive salary requirements that preclude hiring additional staff when needed. Because of this, network staffing ratios in schools are significantly higher than within industry. The Technology Alliance (1998) estimated that a typical network administrator in Washington's public schools typically supports over 350 personal computers in a school while her private industry counterpart supports about 40 personal computers.

The Technology Support Index, an educational technology assessment tool developed by Dr. Chip Kimball of the Lake Washington School District, describes several domains of technology support. The domains are: equipment standards, staffing and processes, professional development, and intelligent systems. Each domain is described in terms of the status of the school's technology support: "emergent," "islands," "integrated," or "exemplary" technology support. For instance, an "emergent" computer-to-technician ratio is over 250:1. An "exemplary" computer-to-technician ratio is 75:1. By this definition, Washington State school district network support overall would be considered "emergent," or "A strategy or domain that has a need for attention and improvement… in the beginning states on a developmental continuum, and if the issues aren't addressed on-going support challenges will likely be found."[18]

Educational Technology Uses

Washington teachers and students increasingly use educational technology for learning and teaching support. Certificated staff predominantly use computers for word processing, e-mail and communications, on-line grading and attendance, and to a lesser degree, web research—in 1993 word processing and stand-alone grade book programs were mainly used.

Students predominantly use computers for word processing and web research, and to a lesser degree, instructional software and drill and practice, while drill and practice was mainly used in 1993.

A small but growing number of K-12 students (3,432) are currently enrolled in on-line courses—like e-mail accounts, online courses were virtually non-existent in 1993. New initiatives, particularly Governor Locke's "Digital Learning Commons" initiative (discussed further below) are promoting on-line learning opportunities for Washington's students.

A survey conducted by the University of Washington of 6th-12th grade students for the Digital Learning Commons reported that non-home locations for computer use were mostly at school and school computer labs, followed by the local library. Students in upper grade levels are more likely to use computers for schoolwork in high school. Almost sixty percent of 11th and 12th graders reported that they used a computer for schoolwork four or more hours weekly. Almost half (45 percent) of early high school students (9th and 10th grade) and 30 percent of middle school students reported that they used a computer more than four hours or more weekly.

Online Learning: Digital Learning Commons Task Force Findings

In February 2002, Governor Gary Locke convened a task force of leaders from education, business, and government to consider how to deliver a statewide digital education initiative quickly, effectively and equitably. The task force focused on determining a vision for the future and workable first steps to achieving it. The task force identified implementation challenges and explored relevant policy issues. The task force also learned that online

coursework already plays a role in Washington schools. A survey conducted OSPI in November 2001 found that 25 percent of the secondary schools in the state had one or more students enrolled in online classes during the 2001-2002 school year. Similarly, the task force's telephone survey determined that 13 percent of the students surveyed had taken an online class at some time during their educational life, and that over half (53 percent) of these children received credit for online courses from their school or district. Several Washington-based online schools and programs discussed in Appendix E are among the providers that students used for online coursework.

Regarding other online learning resources and tools, significant numbers of collaborations, special arrangements, and programs provide a wealth of opportunities for students and teachers. However, the absence of a central source of information and linkage to these online tools and resources keeps many students and schools from making use of them.

An analysis of digital education efforts in other states conducted for the task force revealed mixed success in many of these early efforts. Notably, the initial funding for several statewide online course programs was from a one-time state government appropriation, with ongoing funding expected to come from the state entirely as a general fund line item. This lack of a self-sustaining model has left these states vulnerable during periods of state budget constraints.

Progress Compared to the 1994 Technology Plan Recommendations

The 1994 technology plan recommendations were spirited and ambitious, reflecting the newly enacted education reform legislation and Washington State's newly created plans for the statewide education reform initiatives.

Table 6.1 provides a summary of the 1994 technology plan recommendations (see Appendix D for the full text summary of each recommendation). Several recommendations have been successfully adopted, including:

- The development of partnerships, alliances, and public awareness (Recommendation 2)
- Affordable communications (Recommendation 3)
- Regional support for educational professionals (Recommendation 7)
- The K-20 Network (Recommendation 8)
- Electronic (online) resources (Recommendation 9)
- Educational technology policies (Recommendation 12).

Table 6.1. 1994 Technology Plan Recommendations and Current Status

1994 Technology Plan Recommendation	Current Status
1. Integration of Technology into Educational Initiatives	Difficult to say to what extent "technological implications and opportunities" were considered by education initiatives at that time. The ETAC has periodically served in an advisory capacity for educational technology policy.
2. Partnerships, Alliances, and Public Awareness	The recommendation largely focused on OSPI-based initiatives. OSPI has sponsored multiple educational technology initiatives since 1994. Additionally, Section 5, State of the State, describes current status of multiple initiatives that have directly and indirectly involved OSPI.
3. Affordable Telecommunications Access for Schools	The Legislature supported the development and continued support for the K-20 Network. The K-20 Network and E-rate program significantly address this recommendation.
4. State Policies and Funding Strategies Which Reflect Schools' Technology Requirements	This recommendation was very broad and consequently gauging progress is difficult. Recommendation 4 states, "It is recommended that all development, adoption and/or revision of policies and procedures for the common school system by the State Legislature, the State Board of Education, the Commission on Student Learning and OSPI reflect current technological requirements for learning."
5. Levy and Bond Regulations Which Reflect Schools' Technology Requirements	SSB 6515 (2002 c 275) clarifies that capital projects funds may be used by school districts to pay the costs of implementing technology systems, facilities, and projects. Limited primarily to hardware system upgrades, not curriculum, instruction, assessment, or professional development practices.
6. State Allocation to Districts for Technology	Various grant programs have been established through a mix of federal and state sources. No dedicated grant program for educational technology in place.
7. Regional Support for Educational Professionals	$4.05 million provided biennially supports the Educational Technology Support Center Program, the Educational Technology Development Center, and OSPI staff to provide statewide leadership in technology.
8. Enhancing K-12 Education's Statewide Electronic Network	By December 1999, all ESDs, 294 school districts, the schools for the deaf and blind students, and OSPI were connected to the network. Over 95 percent of K-12 classrooms in Washington state now have access to the Internet via the K-20 Network.
9. Providing Electronic Destinations	Multiple program initiatives underway, directly and indirectly involving OSPI, including online buying cooperatives, class tools, online courses, professional development support, and online databases. See Appendix E, Educational Technology Initiatives.

1994 Technology Plan Recommendation	Current Status
10. Integrating Technology into the Curriculum	No comprehensive state-funded initiative to date. Primarily limited to course development and professional development opportunities provided through a variety of public and private resources.
11. Technology in Teacher Preparation Programs	No comprehensive statewide initiative to date. Multiple public and private initiatives underway for professional development in pre-service and in-service programs. The ETAC has adopted the ISTE National Educational Technology Standards (NETS) framework for teachers.
12. Information Policies	Almost all (294) districts have formulated educational technology plans and have adopted educational technology policies. Federal requirements under ESEA will lead to more rigorous requirements as these plans are updated in the coming year.

Source: *Report to the Legislature on the Washington State Technology Plan for theK-12 Common School System* (1994). Olympia, WA: Office of Superintendent of Public Instruction.

Other recommendations have been implemented partially or, based on the current state of the state and gap analysis, reflect continuing needs. In particular, although many individual efforts are underway, there have been no comprehensive state-funded and sustained initiatives in support of integrating technology into curriculum (Recommendation 10), and technology in teacher preparation programs (Recommendation 11).

Progress Compared to Other States

Washington compares favorably to other states on several measures in student access to educational technology and applications.

The K-20 Educational Telecommunications Network was one of the first statewide network backbones in the country providing access to almost all school districts statewide. The Legislature's continuing support of the network has extended its use beyond K-12 to universities, community and technical colleges, and libraries. As noted previously, today almost all instructional classrooms statewide (95 percent) can access the Internet from one or more classroom computers. This compares favorably with many other states.

The *2002 State New Economy Index* (Progressive Policy Institute)[19] measures, among other items, the amount of technology in schools based on:

- Students per multimedia computer

- Students per Internet connected computer
- Percentage of schools with Internet access through a T1 or cable modem
- Percentage of schools where at least 50 percent of teachers use the Internet in class
- Percentage of schools where at least 50 percent of teachers have school-based email addresses.

Based on this aggregate measure, Washington ranked 27th nationwide. According to the Progressive Policy Institute, states that ranked highest in integrating information technology into schools are the less populated and more geographically dispersed states, perhaps suggesting a need for rural and remote areas to seek higher levels of access and connectivity.

On other measures described in *Technology Counts*, Washington does not compare as favorably on several educational technology measures (Education Week, 2002):

- Washington does not provide any incentives for teachers to use technology (compared with, for instance, Wyoming, which provided 20 days of state-financed training in 2001-02 to more than 600 teachers and 100 administrators to develop standards-based classrooms using technology)
- Washington does not have online testing available for the Washington Assessment of Student Learning or other statewide tests (compared with, for instance, South Dakota's online assessment system)
- Although Washington requires technology training in educational technology for teacher certification, the requirements are broadly defined, are not specific to required knowledge, skills, or abilities (KSAs), and may be highly variable across the schools of education (compared with, for instance, Idaho's teacher performance standards).
- Washington does not have state educational technology standards and Washington does not test students in the use of educational technology (compared with, for instance, Oregon's student performance standards).
- Although several Washington schools provide online courses or online learning academies, currently there is no statewide support for all schools to provide online courses to students. Governor Locke has proposed a Digital Learning Commons that would provide statewide support for online learning.

Summary of Current Barriers and Issues

Similar to barriers cited in national studies of educational technology, Washington schools encounter barriers such as:[20]

- The lack of equitable and universal access to up-to-date equipment; teachers are reluctant or altogether unwilling to use equipment that is severely limited instructionally, performs unreliably, or requires extensive support to access.
- Inadequate or outdated technology-based instructional materials and on-line information; districts with poor Web site design or access may make teachers and students reluctant to use technology at school
- Shortage of information technology (IT) workers due to funding constraints or private sector competition for highly qualified network administrators at salaries that are higher than what schools can support
- Buildings not "ready" to use technology and telecommunications
- Lack of budgeting and funding for support, maintenance and upgrading of equipment
- Lack of funding for planning, staff development, and curriculum development
- State fiscal policies that restrict the use of bonds and levies mainly to hardware expenditures.

6.5 THE BOTTOM LINE: EDUCATIONAL TECHNOLOGY AND STUDENT ACHIEVEMENT

Several studies point to the promise and difficulty in gauging the effect of educational technology on student achievement (Ringstaff and Kelley, 2002; Schacter, 1999; Smerdon, et al., 2000; Becker, 2000). Reviews of studies on educational technology highlight the variability in terms of the technology used (and the speed at which it is changing), the population of interest (general classroom environment, teachers, poor students), and the dependent variables or measures of interest.

Measuring the impact of technology use on student achievement is “fraught with difficulties” since classrooms “are not experimental laboratories where scientists can compare the effectiveness of technology to traditional instructional methods while holding all other variables constant” (Ringstaff and Kelley, 2002: 23). Despite this caution, an emerging body of research provides optimism that, when applied appropriately and judiciously, educational technology can improve student achievement for students in general as well as for those who are at-risk or have

special needs. Conditions that favor desirable educational outcomes acknowledge that technology is not a panacea for difficult decisions and hard work to improve student achievement. Technology is merely “one piece of the puzzle.”

Teachers, in order to use technology effectively, need adequate and appropriate training and they need to hold certain pedagogical beliefs in order to use technology effectively. Educators and their students need sufficient and accessible equipment and the technology needs to be put into the right instructional environment. Students need to be supported at home as well as at school in how they use educational technology. Educational leaders need to develop appropriate policies that encourage rather than unnecessarily hinder, block, or filter material that is relevant to a student’s educational goals. To make all this happen, network administrators need to be on hand (i.e., staffed) in order to provide teachers, administrators, and students with sufficient technical and instructional support.

Educational technology is not simply a matter of providing a stand-alone computer laboratory accessible only at a certain time of day. Technology, in order to be effective in raising student achievement, must be integrated within the instructional and curricular framework. It must complement an instructional objective rather than be regarded by teachers and administrators as an unnecessary intrusion into a pre-established curriculum (Ringstaff and Kelley, 2002; Becker, 2000, Smerdon, et al., 2000; Becker, 1999; Schacter, 1999; National School Boards Foundation, 2002; Levin and Arafeh, 2002; Byrom, 1998).

In the following section, the Educational Technology Advisory Committee articulates how the educational technology gaps identified in this report can be addressed.

7.0 Recommendations

This section describes the recommendations developed by the Educational Technology Advisory Committee. Throughout the spring and summer of 2002 the advisory committee met several times to discuss the progress of the plan, including:

- Adopting a vision for educational technology
- Defining educational technology
- Adopting the International Society for Technology in Education (ISTE) foundation standards for teachers, students, and school educational leaders.

On August 15, 2002, the ETAC met in Ellensburg, Washington to review draft recommendations. The advisory committee considered potential recommendations in the areas of networking and connectivity, policy and standards, funding strategies, learning and teaching (curriculum, instruction, and assessment), and state-level support. The meeting participants developed a set of twelve recommendations incorporating and synthesizing major themes and focus areas:

- *Standards and Professional Development:*
  - *Teacher, Para-professional, and Educational Leader Technology Standards and Professional Development*
  - *Pre-service Educational Technology Training*
  - *Student "Technology Literacy" Standards*
- *Fiscal Policy and Strategic Funding:*
  - *Flexibility in Bonds and Levies*
  - *State Educational Technology Funding/Revolving Fund*
  - *Enhanced Educational Technology Support*
- *Learning and Teaching Support:*
  - *Enhanced K-20 Educational Telecommunications Network*
  - *Targeted Support for Needy Schools*
  - *Digital Educational Content*
  - *Best Practices in Educational Technology*
  - *Community Engagement Through Educational Technology*
  - *Statewide Data-Driven Decision-Making System.*

Note that all recommendations are given equal weight. The order of the recommendations does not reflect priority.

The ETAC strongly emphasizes the holistic relationship between the recommendations and the primary outcome of interest, student learning. As shown in *Figure 7.1*, student learning is the central focus of educational technology. Educational technology opportunities lie in standards and professional development, learning and teaching support, and fiscal policy and strategic funding. Surrounding the recommendations is the notion of continuous improvement through research and development, dissemination and infusion of best practices, and evaluation and feedback.

Table 7.1 provides a tabular listing of the recommendations. Again, the ordering of the recommendations does not imply priority. The following sections describes each recommendation in terms of:

- Description
- Rationale and expected outcomes
- Cost elements
- Timeframe considerations
- Connections and potential leverage with current or emerging initiatives.

Cost elements describe general cost considerations. Specific funding opportunities may include state support through local school district allocations (including levy support and E-rate support), state legislative appropriations, federal support, and public-private partnerships. As recommendations are developed, the ETAC will develop specific cost and savings estimates in comparison with current practices.

Timeframe considerations outline the general steps and estimated time required for implementation. Since many specific milestones depend on legislative or rulemaking actions, several of the recommendations do not provide specific milestones. Conceivably, all recommendations could be adopted in the 2003-05 biennium but that is highly unlikely due to policy, fiscal, and implementation constraints. More likely, school districts, the Legislature, the ETSCs, and other stakeholders will selectively address specific recommendations over time. The ETAC will revise the timeframes periodically to note adoption and current status.

Figure 7.1. Educational Technology Advisory Committee Recommendations Framework

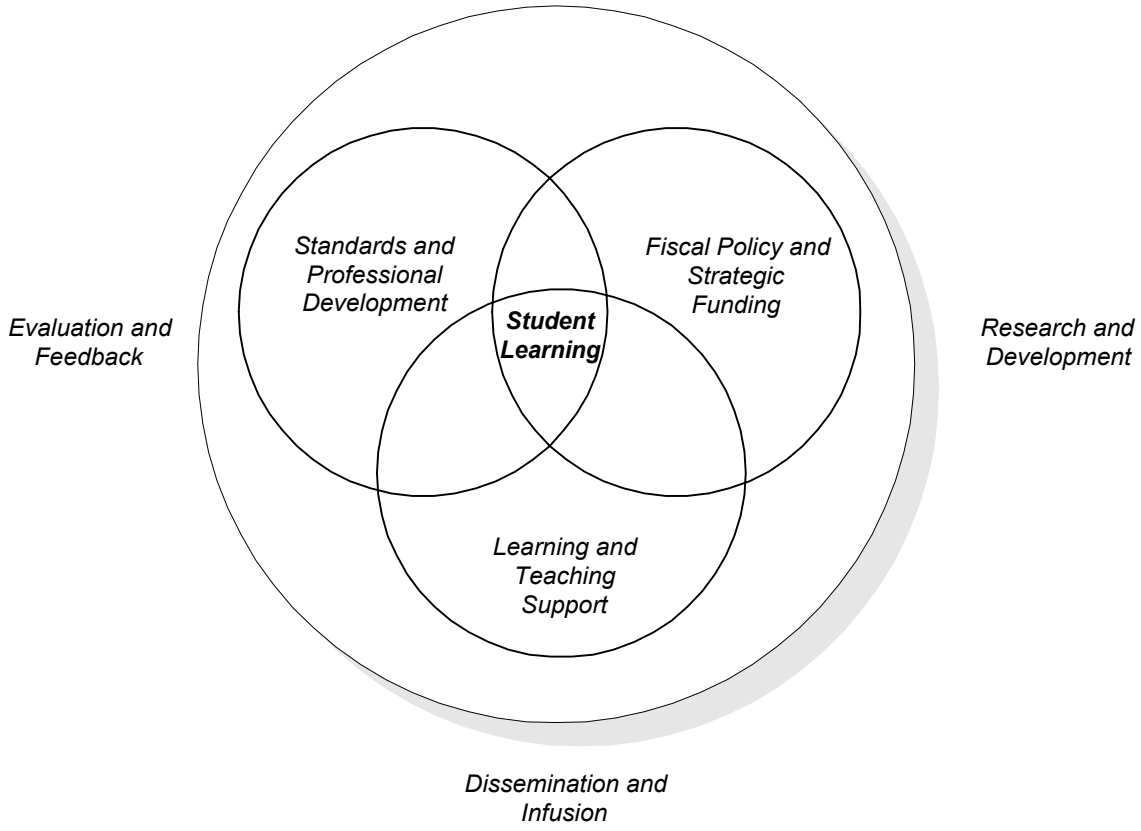


Table. 7.1 Educational Technology Advisory Committee Recommendations

Recommendation	Short Description
STANDARDS AND PROFESSIONAL DEVELOPMENT	
Teacher, Para-professional, and Educational Leader Technology Standards and Professional Development	The State Board of Education should adopt educational technology proficiency standards for all teachers, para-professionals, and educational leaders. The Legislature should provide professional development support to assist teachers, para-professionals, and educational leaders in meeting the new standards.
Pre-Service Educational Technology Training	The State Board of Education and the Superintendent of Public Instruction should develop pre-service educational technology training requirements for teacher pre-service programs and administration certification programs, including alternative certification programs. The Legislature should provide funding to support districts in hiring staff who are highly qualified in educational technology based on their training and certification.
Student "Technology Literacy" Standards	The Superintendent of Public Instruction, with the support of the Legislature and school districts, should begin developing educational technology essential learning requirements, define "technology literacy" in this process, and develop student performance assessments consistent with the educational technology learning requirements. The state should provide sufficient funding to conduct this process with the full involvement of the educational community, parents, students, and other stakeholders.
FISCAL POLICY AND STRATEGIC FUNDING	
Flexibility in Bonds and Levies	The Legislature should provide school districts with more flexibility in how local levies and bonds funds may be spent. Schools should be encouraged to account for ongoing maintenance and depreciation of computers, and to explore leasing equipment when appropriate.
State Educational Technology Funding/ Revolving Fund	The Legislature should create a dedicated revolving fund for educational technology hardware, software, professional development, and content acquisition. The Legislature should allocate educational technology funding to districts based on a FTE student formula, with specific funding earmarked toward professional development.
Enhanced Educational Technology Support	The Legislature should develop network staffing ratios and a supporting salary schedule to improve the ratio and funding of network administrators and technical support in school buildings.

Recommendation	Short Description
LEARNING AND TEACHING SUPPORT	
Enhanced K-20 Educational Telecommunications Network	The Legislature should maintain the current funding level to ensure equitable access to the K-20 Educational Telecommunications Network for all K-12 districts, and maintain and expand technical support and training for K-12 districts in their use of the K-20 Network.
Targeted Support for Needy Schools	The Legislature should provide targeted support to assist needy schools with connectivity or other specific needs articulated in an approved district technology plan.
Digital Educational Content	The Legislature should support the state in developing and providing digital educational content (new and through current partnerships) that is comprehensive, current, and culturally appropriate.
Best Practices in Educational Technology	The Superintendent of Public Instruction, with assistance from the Legislature and school districts, should identify, promote, and fund proven educational technology practices, professional development strategies, and classroom modeling in educational technology.
Community Engagement Through Educational Technology	The state should assist school districts in creating community connections with grant funding and technical assistance in: (1) Providing after-school access to computers (leveraging existing technology resources) (2) Using online resources to showcase student work, communicate with parents and guardians about student progress, and encourage collaboration (3) Providing links to internal or external venues that allow students who are highly skilled technologically to pursue career preparation.
Statewide Data-Driven Decision Making System	The Legislature should fund the creation of a statewide data management system that will collect longitudinal data at the student level. This system will permit the state to have access to clean, reliable, and accurate data to run statistical inferences and perform research analysis. Key elements should include a mechanism for classroom teachers to access classroom grades, attendance, lesson plans, and other curriculum, instruction, and assessment tools based on best practices. The system should also allow classroom teachers and staff to assess student performance across schools (track mobility, prior academic achievement, and other student characteristics related to their academic achievement.).

7.1 Teacher, Para-professional, and Educational Leader Technology Standards and Professional Development

Description

The State Board of Education should adopt educational technology proficiency standards for all teachers, para-professionals, and educational leaders. The Legislature should provide professional development support to assist teachers, para-professionals, and educational leaders in meeting the new standards.

Rationale and Expected Outcomes

Standards are necessary for the effective and appropriate application of educational technology. Lacking standards, many of the issues concerning professional capacity to use educational technology effectively will continue. Well-trained teachers are more-likely to adopt appropriate educational technology applications in their learning and teaching activities (Becker, 2000). Standards provide a means to gauge performance and to identify cost-effective solutions.

On March 27, 2002, the ETAC took the following actions:

- The Teacher Competencies Working Group recommended that the ETAC adopt the ISTE Technology Foundation Standards for Teachers as Washington State's recommended standards for our 296 school districts. **The ETAC approved the recommendation unanimously.**

- The Administrator Competencies Working Group recommended that the ETAC adopt the ISTE Technology Standards for School Administrators Framework as Washington State's recommended standards for our 296 school districts. **The ETAC approved the recommendation unanimously**. The standards will be presented as "Technology Standards for Educational Leaders."[1] Technology coordinators will likely be required (and in many cases already are required) to meet more rigorous standards.

Standards cannot be implemented effectively without statewide adoption and supporting resources to ensure that educational professionals have the training and release time necessary to master the requisite knowledge, skills, and abilities. The ETAC believes that statewide teacher technology requirements should NOT be imposed unless funding is provided for appropriate professional development, including workshops, intensive programs such as the Teacher Leadership Project,[21] and peer coaching.

[1] Note: "Educational Leader" is defined as superintendents, principals, curriculum, instruction, and assessment directors, and other educational leadership roles within the school district. "Educational Leader" does not include school board members.

Educational leadership standards also require professional development so administrators take the lead in integrating educational technology best practices and skills in their districts and schools.

The recommendation has been expanded to include para-professionals, as both the "No Child Left Behind" federal legislation and the soon-to-be-released OSPI Strategic Plan for 2002-07 require technology standards for school para-professionals.

If standards are not adopted, they should be supported as a model for districts. Voluntary adoption of standards can be promoted by providing professional development funding that is conditional on school district adoption of the educational technology standards.

Several lasting benefits are expected:

- Harmonize educational technology proficiency standards
- Provide more cost-effective and uniform models of educational technology training
- Bring current training standards up to accepted national standards
- Address ESEA requirements for professional educational technology proficiency
- Provide a measure to gauge the adequacy of educational technology knowledge, skills, and abilities in the educational workforce.

Cost Elements

National standard-setting organizations such as the International Society for Technology in Education (ISTE) and supporting affiliate organizations have developed standards and frameworks for educational technology standards, and these are the standards that the ETAC has unanimously adopted. Consequently, a large cost element, developing the standards, will not be incurred.

However, in order to “Washingtonize” the standards, the ETAC anticipates that the State Board of Education and the Superintendent of Public Instruction would have to undertake the following tasks:

- Identify gaps or enhancements relevant to Washington’s current educational technology proficiency requirements, i.e., evaluate current standards and practices in the field
- Revise and/or adopt the ISTE standards accordingly

- Identify professional development components and associated costs, including pre-service requirements in schools of education and in-service professional development strategies

- Provide oversight by the State Board of Education and OSPI to monitor standards development, professional development program delivery, and report to the Legislature on standards adoption.

Timeframe Considerations

A four-year implementation timeframe is envisioned:

- Standards adoption would take approximately one year following legislative appropriation and rulemaking action initiated by the State Board of Education

- In year two following standards adoption, professional development support should commence in support of the standards

- Evaluation of standards adoption and progress should be provided to the Legislature after the first and second years following professional development funding and support.

Connections and Potential Leverage with Current or Emerging Initiatives

The strongest connection with the standards development process is with the ISTE and supporting professional development venues. Washington State has many educational technology professional development venues underway. There is strong professional development capacity within the state currently to address new educational technology standards.

7.2 PRE-SERVICE EDUCATIONAL TECHNOLOGY TRAINING

Description

The State Board of Education and the Superintendent of Public Instruction should develop pre-service educational technology training requirements for teacher pre-service programs and administration certification programs, including alternative certification programs. The Legislature should provide funding to support districts in hiring staff who are highly qualified in educational technology based on their training and certification.

Rationale and Expected Outcomes

Washington State does not require specific technology courses for licensure of teachers or administrators. It encourages the Colleges of Education to integrate technology competencies

into methodology and content courses rather than offering them as stand alone courses. It also requires teachers to demonstrate competencies in order to obtain a certificate (see below).

Washington State does not require a specific test be written to receive an initial (Residency Certificate) license. However in order to be granted a license the candidate must provide evidence of meeting the standards as defined in WAC 180-78A-270. Sections that specifically address technologies are: (d) the impact of technological and societal changes on schools and (x) educational technology including the use of computer and other technologies in instruction, assessment and professional productivity.

See Section 5, State of the State, and Section 6, Gap Analysis, in particular, teacher training and barriers to effective teacher adoption of educational technology. The ETAC has also expressed concern about the lack of current certification programs in educational technology and local variation in program delivery between the teacher colleges.

Several lasting benefits are expected:

- Harmonize educational technology proficiency standards for future teachers coming into the educational system
- Provide more cost-effective and uniform models of educational technology training
- Bring current training standards up to accepted national standards
- Address ESEA requirements for professional educational technology proficiency
- Provide a measure to gauge the adequacy of educational technology knowledge, skills, and abilities in the educational workforce.
- Harmonize pre-service teacher training requirements with expected standards for in-service teachers (see Recommendation 7.1).

Cost Elements

If Recommendation 7.1 is adopted (Teacher, Para-professional, and Educational Leader Technology Standards and Professional Development), then additional costs should be relatively minor since the adoption of the standards will provide a framework for developing pre-service requirements. The major cost elements are allocations to the State Board of Education and OSPI to:

- Evaluate pre-service educational technology requirements in other states

- Evaluate applicability to ISTE and modified standards in Washington State, as appropriate
- Undertake, through rulemaking, proposed training requirements
- In coordination with the Colleges of Education, develop implementation guidance and supporting resources.

Timeframe Considerations

A four-year implementation timeframe is envisioned:

- Standards adoption would take approximately one year following legislative appropriation and rulemaking action initiated by the State Board of Education
- In year two, Colleges of Education and other training providers would require a period of time (assume one full academic year) to incorporate the new training requirements into their educational programs. During this time, pilot programs could be initiated
- In years three and four, evaluation of training requirements and progress should be conducted following adoption of pre-service training requirements into instructional programs

Connections and Potential Leverage with Current or Emerging Initiatives

There are similar connections to the initiatives described under Recommendation 7.2 and discussed in Section 5, State of the State, and Appendix E, Educational Technology Initiatives.

7.3 STUDENT "TECHNOLOGY LITERACY STANDARDS"

Description

The Superintendent of Public Instruction, with the support of the Legislature and school districts, should begin developing educational technology essential learning requirements, define "technology literacy" in this process, and develop student performance assessments consistent with the educational technology learning requirements. The Legislature should provide sufficient funding to conduct this process with the full involvement of the educational community, parents, students, and other stakeholders.

Rationale and Expected Outcomes

On March 27, 2002, the Student Competencies Working Group recommended that the ETAC adopt the ISTE Technology Foundation Standards for Students as Washington State's

recommended standards for our 296 school districts. **The ETAC approved the recommendation unanimously**.

A fundamental conceptual issue revolves around educational technology within the current standards framework. Should educational technology standards be a stand-alone component of the Essential Academic Learning Requirements (EALRs) or infused throughout current requirements? That is, should Washington State adopt the ISTE NETS for Students in whole (or a *"Washingtonized"* version) as our Educational Technology Learning Requirements, or weave the standards into the EALRs?

The advisory committee supports beginning this process of integrating educational technology into the education reform effort more purposefully and deliberately, using ISTE standards as the initial standards. As shown in Appendix C, the relationship of educational technology to the EALRs has been mapped conceptually, with specific examples of educational technology benchmarks mapped to each grade level standard. Further efforts undertaken by the ETAC and educational technology stakeholders should specify how current educational technology applications can be applied to strengthen the EALRs and student academic achievement.

Impacts should be evaluated in terms of Washington's four student learning goals; namely, the advisory committee expects that technology literacy will improve student outcomes in terms of the knowledge and skills needed to: [13]

1) Read with comprehension, write with skill, and communicate effectively and responsibly in a variety of ways and settings;

2) Know and apply the core concepts and principles of mathematics; social, physical, and life sciences; civics and history; geography; arts; and health and fitness;

3) Think analytically, logically, and creatively, and to integrate experience and knowledge to form reasoned judgments and solve problems; and

4) Understand the importance of work and how performance, effort, and decisions directly affect future career and educational opportunities.

Another impact is compliance with federal requirements under ESEA requiring states to develop student technology literacy standards. That is, technology literacy is assumed to be a pathway to improved academic achievement, especially for children in poverty and at-risk of academic failure. Increased technology literacy in these student populations should have a lasting positive impact on educational achievement and student outcomes.

Cost Elements

Albeit on a smaller scale, one model for developing the standards is based on the EALR development process involving parents, students, and educators statewide in developing and refining the standards for statewide adoption. Current performance standards exist, so additional costs are incremental. Several cost elements include:

- Evaluating the ISTE Technology Foundation Standards for Standards and student technology literacy standards in other states
- Identifying the corresponding educational technology benchmarks in the EALRs, i.e., mapping the ISTE standards to the EALRs
- Adopting new benchmarks either through the EALRs or by supporting district initiatives such as student portfolios, degree projects, or culminating projects
- Seeking public comment and stakeholder involvement in reviewing and, as needed, revising the draft technology literacy standards
- Allocating resources to OSPI (or the ETAC itself) to oversee the standards development process, report to the Legislature on progress, and evaluate student outcomes.
- Identifying related technology literacy opportunities such as adding an online technology literacy assessment component to the Washington Assessment of Student Learning.

Timeframe Considerations

A three- to five-year implementation timeframe is envisioned:

- Development of “technology literacy” standards should commence following allocations from the Legislature in support of the development process. The ETAC anticipates a one-year developmental process.
- In year two, technology literacy standards should be implemented. One implementation model is to pilot-test the technology literacy standards in a representative group of school districts through a combination of state, local, and other support
- In year three, specific technical issues related to technology literacy standards should be reported to the Legislature one year following implementation of the technology literacy standards, based on the lessons learned by the pilot districts

- Further statewide adoption of the technology literacy standards should be phased in based on lessons learned, current policy directions (state and federal), and educational technology developments.

Connections and Potential Leverage with Current or Emerging Initiatives

Multiple educational technology initiatives aimed at curriculum and instruction (see Section 5) are applicable to developing technology literacy skills. Under the Enhancing Education Through Technology provisions under ESEA, Washington's NO LIMIT project will be evaluating student outcomes.

Ongoing review and evaluation associated with the EALRs and the Washington Assessment of Student Learning should be leveraged to target the incorporation of technology literacy standards.

Ongoing research and evaluation nationwide is evaluating technology literacy in terms of specific dimensions of literacy and expected student outcomes. Under ESEA, the U.S. Department of Education will be conducting a long-term study on the impact of educational technology on student achievement.

7.4 FLEXIBILITY IN BONDS AND LEVIES

Description

The Legislature should provide school districts with more flexibility in how local levies and bonds funds may be spent. Schools should be encouraged to account for ongoing maintenance and depreciation of computers, and to explore leasing equipment when appropriate.

Rationale and Expected Outcomes

See Section 5.2, Educational Technology Funding. Several problems are evident:

- Districts with low per-student property valuations are less likely to spend money on educational technology
- All districts are restricted from using capital bonds for anything other than hardware acquisition and limited software purchases. The primary vehicle for raising educational technology revenue at the local level remains special operation levies
- Equipment maintenance, depreciation, and leasing are not allowed under current bond and levy laws because they are on-going costs, not one-time costs

- Increasingly, local revenues compose a significant amount of total school funding. Today, almost one out of every five dollars (19 percent) is raised through local revenues, mostly through bonds and levies (Bigelow, Jones, and Stead, 2002)

- The levy supermajority requirement (60 percent of the voters must indicate "YES" in a district-wide election for the levy to pass) limits the total number of successful levies and may inhibit some districts from proposing special levies, including those for educational technology.

Consequently, as local dollars become an increasingly significant source of school district revenue in Washington State, districts with low property valuations are less likely to be able to afford educational technology. This raises significant *equity* issues, that is, ensuring that a child's educational opportunities are equitable across the state, as required by the Basic Education Act.

Districts that are unable to raise sufficient local dollars for educational technology also raise a fundamental issue of *adequacy* for students. If districts have poor levels of access to the Internet for instruction, outdated or unreliable computers, or staff who are not fully qualified to take advantage of technology for their student learning needs, are their students receiving an adequate educational opportunity?

The ETAC recognizes that while revising levy laws will not ensure equity (and may even exacerbate some equity issues without adopting other proposed ETAC recommendations), easing levy requirements will at least allow for smarter use of currently available funding. For instance, making it easier to pass levies through a simple majority will allow certain districts to propose special levies for educational technology with a higher probability of success.

Revising state law to allow additional uses for capital bond levies to support educational technology will allow school districts to focus on areas that are high priority, including training for educators on applying software or Internet applications in specific instructional settings rather than limiting training to system operations.

Cost Elements

The cost element at the state level would be minor. Local districts would incur additional costs at voter discretion through levy and bond elections.

Timeframe Considerations

Timeframes for levy law revisions are entirely dependent on legislative action.

School districts may benefit from additional state guidance on equipment leasing and depreciation options. OSPI and the ESD Educational Technology Support Centers (ETSCs) should develop supporting guidance by the 2003-04 school year. This will provide timely

information on this issue to school districts while allowing OSPI and the ETSCs to evaluate legislative actions taken in the 2003 legislative session and reflect it in the guidance accordingly.

Connections and Potential Leverage with Current or Emerging Initiatives

This recommendation builds upon recommendations made by the Technology Alliance (1998). It is also consistent with other educational finance objectives to ease levy requirements for the purpose of raising additional school district revenues.

7.5 State Educational Technology Funding/Revolving Fund

Description

The Legislature should create a dedicated revolving fund for educational technology hardware, software, professional development, and content acquisition. Options include creating a dedicated state fund, allowing districts to create district revolving funds, or both.

The ETAC also unanimously supports an equitable funding formula based on a simple FTE student basis. The Legislature should allocate educational technology funding to districts based on a FTE student formula, with specific funding earmarked toward professional development. The funding could be administered as a grant program with an emphasis on curriculum, instruction, and assessment professional development.

Rationale and Expected Outcomes

A revolving fund for educational technology would allow districts to conduct long-term planning rather than year-by-year budgeting. Many educational technology acquisitions require a longer planning horizon than one year and providing a dedicated fund will allow districts to anticipate carryover funding. This will provide a longer timeframe for educational technology projects. Allocating funding for professional development will address one of the most significant needs identified in the State of the State (Section 5) and Gap Analysis (Section 6), namely:

- Multiple program offerings for professional development, while offering singular benefit to many schools or consortia, has created a fractured approach to systemic training and skills development

- As noted above, some districts are able to offer professional development and other educational technology offerings while other districts are less fortunate. An equitable, statewide approach to professional development and other educational technology initiatives should be provided through legislative appropriation.

- Providing funding on a student FTE basis is an equitable approach to educational technology funding.

Cost Elements

The fiscal policy change of creating a dedicated revolving fund would have no direct cost impacts.

Legislative appropriations for educational technology would depend on the specific proposals, for instance:

- Eight hours of training for all certificated teachers in selected uses of educational technology (estimate $8 to $10 million)
- Support targeted professional development opportunities based on a list of the highest priority educational technology needs disaggregated at the elementary, middle, and high school levels (estimate $5 to $10 million)

Timeframe Considerations

The timeframe for adopting this recommendation is entirely dependent on legislative action. The Legislature could choose to:

- Create a revolving fund and provide a revenue source with supporting allocations
- Solely create the revolving fund without allocating funding
- Through the appropriations process, support targeted professional development opportunities without creating a revolving fund.

Subsequent milestones depend on how the Legislature chooses to address this recommendation.

If the Legislature focuses on standards and professional development recommendations in the 2003-05 biennium (see Recommendations 7.1, 7.2, and 7.3), then ongoing support as envisioned in this recommendation might follow effectively in the 2005-07 biennium.

Connections and Potential Leverage with Current or Emerging Initiatives

Multiple educational technology initiatives are underway. The applicability of any current or emerging initiative depends on the specific educational technology funding purposes. However, if, as the ETAC recommends, special attention is paid to professional development, then special attention should be given to the professional development initiatives described further in Appendix E, Educational Technology Initiatives.

7.6 Enhanced Educational Technology Support

Description

The Legislature should develop network staffing ratios and a supporting salary schedule to improve the ratio and funding of network administrators and technical support in school buildings.

Rationale and Expected Outcomes

If schools are to be effective in the application of educational technology, then effective network administration is a critical and unfulfilled requirement that must be addressed. In addition to involving network support professionals in effectively infusing technology into school curriculum, instruction, and assessment activities, districts have other technical support needs. Additional technology support needs include developing, maintaining, and enhancing inventory systems, maintenance histories, help desk systems, file server tools, Web server tools, streaming media tools, basic training, and ongoing network and personnel support.

The most equitable way to provide network administration is by setting a network staffing ratio and providing a support salary schedule. The Technology Support Index describes a range of network staffing to computer ratios, with an "exemplary" ratio being a computer-to-technician ratio of less than 75:1. The Technology Alliance (1998) estimated that a typical network administrator in Washington's public schools typically supports over 350 personal computers.

Implementing technology in schools takes cooperation and teamwork among professionals from many disciplines, and the sharing of successes among schools. Washington's professional educators will benefit from the widest possible collaboration with professionals in information systems.

Cost Elements

One additional FTE per school district would cost an estimated $15 million. Since network staffing ratios vary, it is likely that a staffing ratio and supporting salary schedule would equalize discrepancies in network support. For small districts, the most cost-effective approach would likely be through regional networking cooperatives, which might lower the overall state cost.

Timeframe Considerations

The timeframe for adopting this recommendation is entirely dependent on legislative action.

One option is to make this recommendation dependent on specific actions taken in support of Recommendation 7.7, Enhanced K-20 Educational Telecommunications Network. Specifically, enhancements in network staffing support ratios and salaries would depend on

legislative actions taken in support of enhancing the K-20 Educational Telecommunications Network.

Connections and Potential Leverage with Current or Emerging Initiatives

This recommendation relates in part to continuing support for the K-20 Educational Telecommunications Network. It also relates to other connectivity initiatives and general educational technology effectiveness in schools, i.e., it is a necessary pre-condition for effective technology deployment in Washington's public school system.

7.7 Enhanced K-20 Educational Telecommunications Network

Description

The Legislature should maintain the current funding level to ensure equitable access to the K-20 Educational Telecommunications Network for all K-12 districts, and maintain and expand technical support and training for K-12 districts in their use of the K-20 Network.

Rationale and Expected Outcomes

The K-20 Network is well established, used by multiple agencies, and the question is not whether it should continue but in what form. Further enhancements are needed to strengthen the existing network and to capitalize on opportunities for enhancement in the infrastructure as well as expanding statewide and regional technical support to enhance overall usability and hosting applications.

The ETAC has also expressed considerable interest in extending the network to the classroom through use of IP videoconferencing. The advisory committee recognizes, however, that the timing may not be appropriate given the state's current fiscal limitations.

The K-20 Network is a necessary service for multiple educational technology initiatives and its continued success is essential for K-12 educational technology as well as for learning communities beyond K-12. Washington was one of the first states nationally to support a statewide telecommunications network for public schools. With the ascendancy of the Internet as a learning medium, the K-20 Network has and can continue to have enormous impact on school access to educational technology.

Cost Elements

In the current fiscal biennium, the monies provided for the on-going support of the K-20 Network included $4.0 million to fund the Regional Institutional Technical Units at the nine ESDs, which provide technical support specifically for K-12 schools. It also included $5.7 million for K-

12 transport and maintenance costs not covered by participant co-payments, as well as funding for the KOCO network operations that jointly support all of the K-20 Network.

Additional enhancements and their estimates include:

- Classroom videoconferencing capabilities
- Expanding statewide and regional technical support to enhance overall usability and hosting applications
- Infrastructure enhancements.

Timeframe Considerations

Ongoing support is established and continuing support in future biennia will be needed to maintain the quality of the current system and to undertake improvements needed to keep current with educational technology improvements. Continuing enhancements are expected to be incremental, not one-time. Further enhancements should complement other recommendations that are adopted, for instance, recommendations to improve learning and teaching support (see Recommendations 7.8 through 7.12).

Connections and Potential Leverage with Current or Emerging Initiatives

The K-20 Network is inextricably linked to multiple educational technology initiatives (see Section 5, State of the State, and Appendix E, Educational Technology Initiatives). Two emerging initiatives, Governor Locke's Digital Learning Commons, and Internet 2, are particularly relevant. The Governor's Digital Learning Commons initiative would rely extensively on the K-20 Network for providing online learning opportunities to students statewide. Internet 2 ("Abilene") is under development by the University of Washington and has the potential for advanced Internet applications to be hosted on the K-20 Network.

7.8 TARGETED SUPPORT FOR NEEDY SCHOOLS

Description

The Legislature should provide targeted support to assist needy schools with connectivity or other specific needs articulated in an approved district technology plan. Assistance might involve, for example, providing children on free and reduced-price lunch programs with additional instruction and computers for use at home. Grants could be predicated on specific needs articulated in an approved district technology plan.

Rationale and Expected Outcomes

Under the ESEA, federal funding under the Enhancing Education Through Technology grant provisions will be applied to high-need schools. (Section 5.2 describes federal funding allocations and requirements.) Since the average amount per student is low (about $4 in flow-through grant funding), the ETAC anticipates that additional state support is required in order for recommendation to be successful. "High-need" might be based on the percent of students enrolled in the free and reduced-price lunch program, high percentage of minority or English as a Second Language (ESL) students, and percent of students meeting WASL standards.

Additional funding should be targeted to other high needs, including assistive technologies for disabled students, or funding for students in districts that have experienced levy failures or that have special geographic challenges that limit the adoption of educational technologies.

Cost Elements

The Technology Needs Index, based on student socioeconomic measures, assessment results, and the school ratio of students to computers, can serve as a proxy to target state dollars to needy schools. Special grant considerations can also be formulated to target:

- Students with special needs
- Districts facing financial challenges that limit their adoption of educational technologies
- Native American and migrant populations,

A one-for-one grant matching amount of the federal EETT pass-through dollars would cost approximately $4 million. Districts with an approved technology plan would be eligible for the federal pass-through dollars and the district's approved technology plan could also be used to target resources to additional unmet educational technology needs such as those listed above.

Timeframe Considerations

Funding may be appropriated for this recommendation at any time. The advisory committee recommends matching grants for the 2002-03 EETT grant funding in the 2003-05 biennium to capitalize on the availability of current federal resources and to further leverage federal funding.

Connections and Potential Leverage with Current or Emerging Initiatives

Depending on the specific needs that are supported, there are several initiatives underway. The federally supported NO LIMIT project is targeted at high poverty, high need schools.

Assistive technology projects are underway through the Washington Assistive Technology Alliance (WATA) and the University of Washington Center for Technology and Disability Studies.

Multiple educational initiatives aimed at high need schools are supported through various public and private partnerships. See Appendix B, Bibliography, for additional resources and Appendix E for program descriptions.

7.9 DIGITAL EDUCATIONAL CONTENT

The state should develop and provide equitable access to high-quality digital educational content (new and through current partnerships) that is comprehensive, current, and culturally appropriate.

Rationale and Expected Outcomes

There is currently strong momentum for the state to provide digital content through existing and proposed initiatives, including a "Digital Learning Commons" as proposed by Governor Locke's Digital Education Task Force. Additionally, multiple districts and schools are pursuing online courses. State support can provide economies of scale and quality (peer review and evaluation) across districts. Special attention should be given to high-need students and to the use of assistive technologies.

The digital content should draw from best practices in curriculum, instruction, and assessment and it should use educational technology to improve the delivery of information through Internet and software applications.

Cost Elements

The Digital Learning Commons proposed by Governor Locke's Digital Education Task Force provides one approach for providing digital content statewide. The initiative anticipates a mix of public funding at the state and local levels as well as private partnerships to provide digital content.

Other opportunities include:

- State purchases of digital content that is commercially available
- Forming partnerships with existing digital content providers to merge existing content with new content
- Developing content through state-funded contracts and competitive procurements.

Timeframe Considerations

The Legislature should provide initial funding to identify digital content requirements and development options in the 2003-05 biennium. Governor Locke's Digital Education Task Force is developing specific proposed timelines for the Digital Learning Commons and these should be referred to directly.

Connections and Potential Leverage with Current or Emerging Initiatives

Although there are many online educational content offerings underway at the local, regional, state, and national levels, the strongest linkage is to the Digital Learning Commons initiative. For additional initiatives, see the online courses and content offerings in Appendix E.

7.10 BEST PRACTICES IN EDUCATIONAL TECHNOLOGY

Description

The Superintendent of Public Instruction, with assistance from the Legislature and school districts, should identify, promote, and fund proven educational technology practices, professional development strategies, and classroom modeling in educational technology.

Rationale

Newly emerging empirical research should be targeted in order to identify best practices and disseminate information and best practices cost-effectively. Funding should be targeted to programs that have empirically demonstrated their effectiveness in raising student achievement through educational technology.

This recommendation has two key components: first, that OSPI be charged with actively evaluating best practices in educational technology; and second, targeting grant dollars to empirically demonstrated educational technology initiatives. Many current initiatives are promising but stronger evaluation models are needed to demonstrate whether certain educational technology strategies are effectively raising student achievement.

Targeting funding to certain districts or student populations is worthwhile. However, if the underlying intervention has modest or no effect on student achievement, then the technology will not achieve its intended goal, to raise academic achievement. This requires the state to take an active role in identifying cost-effective practices and limiting scarce resources to those programs that most effectively attain desired objectives.

Specifically, best practices should ensure that teachers have the professional development needed to adapt best practices and implement them in their classroom. This means

using new strategies such as intensive learning experiences, opportunities for professional collaboration, and coaching programs.

Cost Elements

Two primary cost elements are anticipated:

- Providing sufficient funding for OSPI to rigorously evaluate candidate educational technology strategies
- Funding only those program interventions that have been empirically demonstrated to have a positive effect on student achievement, based on rigorous, peer-evaluated research.

Timeframe Considerations

A multi-year process is envisioned:

- Since the state of educational technology research is relatively new, the Legislature should provide funding to OSPI In the 2003-05 biennium to evaluate promising and demonstrated educational technology practices
- By the 2003-04 school year, OSPI should begin sponsoring demonstration and pilot projects that have been demonstrated to have positive, statistically significant effects on student achievement
- OSPI should, in conjunction with the ETAC process, periodically report to the Legislature on best practices and current issues in educational technology.

Connections and Potential Leverage with Current or Emerging Initiatives

The U.S. Department of Education is currently evaluating the effectiveness of educational technology applications in increasing student academic achievement. Many states are currently involved in state-level analyses of programs and projects. Research institutions, including the University of Washington, are engaged in educational technology evaluations.[22] Since the ETAC planning process is legislatively directed, the ETAC planning process provides an established method to periodically report to the Legislature on current status and issues.

7.11 COMMUNITY ENGAGEMENT THROUGH EDUCATIONAL TECHNOLOGY

Description

The state should assist school districts in creating community connections with grant funding and technical assistance in:

1. Providing after-school access to computers (leveraging existing technology resources);
2. Using online resources to showcase student work, communicate with parents and guardians about student progress, and encourage collaboration;
3. Providing links to internal or external venues that allow students who are highly skilled technologically to pursue career preparation.

Rationale and Expected Outcomes

The ETAC members have consistently stressed the importance of community engagement. Successful educational technology initiatives involve school and home access to the Internet, and it is increasingly evident that educational technology is bridging the gaps between home, school, and communities.

Parents and school staff recognize that one of the greatest benefits provided by educational technology is improved communications, for instance, using the Internet to visit district Web sites for calendars and events, providing parents with the ability to check their student's grades, and to e-mail the teacher concerning student performance. Many schools provide after-hours access to educational technology for teaching and learning purposes, and students seeking career preparation in information technology are using technology to pursue advanced courses while in high school. These are just a few of the many examples where the traditional barriers between K-12 and lifelong learning within the broader context of the community are being broken down by the effective application of educational technology.

In some schools, especially in rural communities, support could take the form of providing staff to assist students, parents, and community members after school with educational technology applications (e.g., Internet-based projects). In other schools, the funding could be used to improve district Web sites that allow parents to assess student grades, progress, and communicate with staff. For highly skilled students, funding might be used to purchase advanced software applications (e.g., CAD/CAM applications) and advanced instruction so students can become proficient in selected technology career paths. As described in Appendix E, program initiatives such as TECH CORPS and other community-based educational technology initiatives could be leveraged further to assist in specific initiatives.

Cost Elements

Similar to other grant programs proposed in these recommendations, specific cost elements depend on the nature of the grants and the allocation requirements. For example, providing an after-school program for students and community members to receive instruction and access to the Internet for research by providing facility and additional staffing could cost an

estimated $7 to $8 million if a half-time staff position is provided after school for this purpose in all 296 school districts.

School districts have undertaken many initiatives in this area and funding would complement school district support. By leveraging state dollars, savings could be realized in specific applications and approaches.

Timeframe Considerations

The timeframe for this recommendation is entirely dependent on legislative appropriations in support of the recommendation. This recommendation could be developed in support of Recommendation 7.3, Student "Technology Literacy" Standards. That is, as standards are adopted in districts, grant funding could be targeted to participating pilot schools as they are implementing the student technology literacy standards. Funding could accompany standards adoption.

Connections and Potential Leverage with Current or Emerging Initiatives

Specific connections depend on the community engagement models that are articulated. For instance, many school districts have exemplary Web site offerings to enhance communication with parents and other community stakeholders.

7.12 Statewide Data-Driven Decision Making System

Description

The Legislature should fund the creation of a statewide data management system that will collect longitudinal data at the student level. This system will permit the state to have access to clean, reliable, and accurate data to run statistical inferences and perform research analysis. Key elements should include a mechanism for classroom teachers to access classroom grades, attendance, lesson plans, and other curriculum, instruction, and assessment tools based on best practices. The system should also allow classroom teachers and staff to assess student performance across schools (track mobility, prior academic achievement, and other student characteristics related to their academic achievement.).

Rationale and Expected Outcomes

The federal ESEA requires states to track student performance comprehensively and to report on selected measures of student achievement. A statewide data management system would contribute to community engagement with appropriate parent and community access to data elements. Although Washington tracks several measures of student progress, the information is not tracked at the student level across grades and across districts. Improved

educational assessment, diagnostics, and consequent statewide educational system improvements would contribute to state education reform objectives.

School districts throughout Washington State have expressed their need to provide curriculum, instruction, and assessment tools for teachers and other educators to improve student learning. Students and parents should also be able to use online tools to take greater responsibility for each student's educational progress. A diagnostic system in concept would:

- Be able to link instructional design and curriculum resources with the state's Essential Academic Learning Requirements (EALRs) and student-level assessment data
- Provide teachers, parents, and students with the ability to identify areas where students are not meeting the school district objectives that are aligned to Washington EALRs
- Be able to identify specific learning strategies, lesson plans, and other relevant resources to assist the student in meeting these requirements.

In these ways, the statewide data-driven decision making system would assist schools in improving student learning, as well as support and accelerate the changes required by education reform.

Cost Elements

There are several cost elements:

- System design and development
- Modification of policies that inhibit the flow of critical information, for instance, developing consistent school district standards for tracking mobility, dropout rates, and attendance
- System management and operations
- Diagnostic feedback and improvements.

While the cost for fully deploying such a system over several years has been estimated at $30-40 million, the overall savings to school districts could exceed $100 million *annually*, thus freeing up scarce resources for deployment in other areas to support school improvement through the integration of educational technology. Savings would accrue by reducing unnecessary duplication of effort between districts and regional consortia. State purchasing of system elements could provide additional savings by leveraging discounts for statewide system development that might not be available at the district level. Finally, combining best practices already undertaken by several districts in Washington State could significantly enhance emerging district systems.

Timeframe Considerations

Initial system design and development standards should be completed by September 2003. Initial data elements and selected modules should be piloted by spring of 2004, and selected components of the system should be operational by the 2004-05 school year.

Connections and Potential Leverage with Current or Emerging Initiatives

Many districts have data management systems. The statewide system must accommodate current district initiatives in order to operate effectively with these systems. Other states have developed or are in the process of developing similar data management systems and their lessons should be capitalized on if Washington undertakes a similar initiative.

8.0 Performance Measures

This section describes performance measures for the educational technology plan. As shown in *Table 8.1*, the ETAC will evaluate each recommendation over time to assess its adoption and overall effectiveness. For each recommendation, a general performance measure is selected. Specific indicators[23] are provided in support of the general performance measure to assist policy makers in evaluating the overall success of each recommendation.

A critical ongoing role for the ETAC will be to assist OSPI in developing specific measurements and/or deliverables for each recommendation as the educational technology plan is implemented. As recommendations are developed and revised, the ETAC will develop quantitative indicators in light of funding and specific performance objectives. The indicators will specify expected outcome measures by established dates.

Table 8.1. Performance Measures and Indicators

Recommendation	Performance Measure	Indicators
Teacher, Para-professional, and Educational Leader Technology Standards and Professional Development ***AND*** **Pre-Service Educational Technology Training**	Standards adoption	Washington State sets technology standards for all teachers, administrators, and teacher educators Standards focus on technology integration into both curriculum content areas and student assessments Standards are validated against national models such as ISTE standards for teachers and NCATE standards for teacher educators Teacher standards are integrated into other Washington State teacher standards and aligned with student technology and content standards
	Professional development funding	The state assists school districts in developing district and teacher education program professional development plans in technology use, in students' safe and acceptable use of technology, and in copyright and intellectual property issues. Washington State financial incentives for professional development: ▪ Include educational leaders ▪ Emphasize effective technology use across the curriculum and in student assessment ▪ Emphasize districts with unusual challenges such as high poverty or other special needs ▪ Include assistance for exemplary technology use in professional development (e.g., virtual communities-of-practice and distant mentoring), increased time for educators' planning Washington State provides technical training programs for school and district technology-coordinators, teacher education program faculty, and for instructors of content courses for teachers State-funded ETSCs aid all educators (including instructors of content courses for teachers), including providing quality reviews and adoption guidelines for digital resources**)**
	Proficiency	Washington State assessments of teachers', administrators', and teacher educators' progress in technology standards are based on educational technology integration into curriculum content areas and exemplary use of technology for assessment

Recommendation	Performance Measure	Indicators
Student "Technology Literacy" Standards	Adoption	Washington State technology standards for students are integrated into and aligned with EALR content standards for students Washington State has technology standards and assessments for students at all grade levels Washington State validates its technology standards for students against national models such as ISTE standards Washington State technology standards for students include provisions for learners with special needs and varied linguistic, cultural, ethnic, and socioeconomic backgrounds, including educational resources designed for universal usability
	Funding	Washington State provides online resources for model curriculum units and lesson plans linking the EALRs and student assessments
	Delivery	Washington State assessments of students' progress in meeting technology standards are integrated into and aligned with Washington State assessments of students' progress in meeting content standards Washington State assessment strategies exemplify effective use of technology for assessment
Flexibility in Bonds and Levies	Fiscal policy	Washington State adopts levy law revisions that enhance educational technology applications with an emphasis on professional development and technology applications in curriculum, instruction, and assessment Washington State develops supporting guidance on equipment leasing and depreciation practices
State Educational Technology Funding/ Revolving Fund	Fiscal policy: educational technology revolving fund	Washington State creates educational technology revolving fund with designated revenue sources and equitable allocation requirements
	Funding: professional development	Washington State allocates funding to effective professional development strategies aimed at educational technology
Enhanced Educational Technology Support	Fiscal policy: network staffing ratios	Washington State develops staffing ratios that reflect current standards, e.g., supported by ISTE and other national organizations
	Funding	Washington State develops supporting salary schedule for network administrators that reflects approximate industry salaries
Enhanced K-20 Educational Tele-communications Network	Funding: Maintenance	Washington State maintains current support for K-20 Network

Recommendation	Performance Measure	Indicators
Enhanced K-20 Educational Tele-communications Network (continued)	Funding: Technical Support	All districts, schools, and teacher preparation institutions are connected via the K-20 network All schools and teacher preparation institutions have high-speed connections to the K20 network
	Enhanced Network	Washington State creates incentives for districts and teacher preparation institutions to receive discounts in implementing and maintaining the network, with an emphasis on enhanced educational applications Washington State provides financial incentives and logistical support for districts collaborating electronically with other districts, higher education, industry, and other social service providers to develop innovative K-20 network uses for education
Targeted Support for Needy Schools	Funding	Washington State provides financial incentives for technology and infrastructure development for districts with high needs
Digital Educational Content	Development	Washington State sponsors educational technology development, including distance education, as well as participation in consortia for this purpose Washington State provides incentives to develop virtual learning environments for students who have difficulty obtaining access to classroom settings and for all students' educational access outside of classroom settings
Best Practices in Educational Technology	Research/ evaluation capacity	Washington State-sponsored research is based on analyses from state-wide database; outcomes inform policy and program decisions Washington State conducts systematic evaluation of technology initiatives, including collection of evaluations from other sources and usage of analyses from state-wide database; outcomes inform policy and program decisions Washington State policy making is informed by comparative analyses of alternative educational improvement practices in other states, sharing information based on common templates for student and fiscal data

Recommendation	Performance Measure	Indicators
Best Practices in Educational Technology (continued)	Infusion	Washington State provides incentives for districts to apply as designated testbeds for innovation, evaluation Washington State provides vendors with guidelines on desired devices, applications, and assistive technologies Washington State offers vendors incentives for developing desired devices and applications and for involving local teachers in adapting standards-based software Washington State conducts systematic dissemination based on transfer and adaptation of innovations via the ETSCs and K-20 network Washington State research, development, and dissemination initiatives emphasize technological innovations that could improve equal educational opportunity Washington State technology purchasing guidelines stress strategic approaches in developing infrastructures for new and existing facilities and for installations of equipment, software, and connectivity Washington State technology infrastructure standards are integrated with districts' and teacher education programs' educational plans Based on advances in technology, Washington State regularly updates technology purchasing guidelines and infrastructure standards for facilities, equipment, software, connectivity Washington State has a program for hardware, software, and online services purchasing, with discounts for large-scale orders Washington State provides extensive financial support for hardware, software, and online services purchasing
Community Engagement Through Educational Technology	Funding	Washington State provides financial support for school district community engagement initiatives based on approved school district technology plans
	Technical assistance	OSPI and the ETSCs provide ongoing technical assistance to assist districts in community initiatives
Statewide Data-Driven Decision Making	System development	Washington State provides incentives for districts using common administrative systems and policies for student and fiscal data Washington State provides financial incentives for participating in data collection and analysis Washington State targets system development to districts with unusual challenges, such as urban and rural settings and impoverished communities

Recommendation	Performance Measure	Indicators
Statewide Data-Driven Decision Making (continued)	Application	Washington State provides districts with comparative data on student achievement and fiscal performance Student and fiscal data is collected from all districts in standardized format and analyzed; comparative information is disseminated to districts and the public in a manner that facilitates making educational policies and decisions Data mining of statistical records is conducted by OSPI, extensively disseminated, and informs policy and program decisions

Indicators adapted from: Dede, C. (2001). *State Policy Framework for Assessing Educational Technology Implementation, Version 4.* (unpublished manuscript).

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Endnotes

[1] Additional information on the ETAC planning process is online at: http://www.k12.wa.us/edtech/techplan.asp#Overview

[2] This description of the education reform process was adapted in part from the draft Washington State Technology Plan for K-12 Common Schools (November 15, 1993), and the federal ESEA application submitted by OSPI to the U.S. Department of Education June 12, 2002. Retrieved August 26, 2002 from the OSPI Web site: http://www.k12.wa.us/ESEA/default.asp

[3] See, RCW 28A.650.015.

[4] Additional information on ESEA, Washington State's application for ESEA funding, and related links is online at: http://www.k12.wa.us/ESEA/default.asp

[5] The ESEA information is derived primarily from *Washington State Consolidated Application For Federal Funds Under the Elementary and Secondary Education Act "No Child Left Behind"* (OSPI, 2002). The application is online at: http://www.k12.wa.us/ESEA/default.asp

[6] With the passage of the ESEA, in federal fiscal year 2003 the Technology Literacy Challenge Fund (TLCF) is consolidated with several other technology programs under *Title II, Part D—Enhancing Education Through Technology.* The TLCF provided funds to obtain computer equipment, Internet connections, content, and staff training.

[7] The ESEA does not provide a definition of "technology literacy," although it is referenced in nine separate places in the act.

[8] Additional information on ETAC meetings, action items, and current activities is online at: http://www.k12.wa.us/edtech/techplan.asp

[9] Please see Appendix B, Bibliography, for additional information on these conceptual frameworks.

[10] The Six Essential Conditions for the Effective use of Technology in Learning are: 1) Vision; 2) Practice; 3) Proficiency; 4) Equity; 5) Access; 6) Systems. Retrieved September 16, 2002 from the North Central Regional Educational Laboratory Web site: http://www.ncrel.org/engauge/framewk/index.htm

[11] "The STaR Chart identifies and defines four school profiles ranging from the "Early Tech" school with little or no technology to the "Target Tech" school that provides a model for the integration and innovative use of education technology. The STaR Chart is not intended to be a measure of any particular school's technology and readiness, but rather to serve a benchmark against which every school can assess and track its own progress." Retrieved September 16, 2002 from the International Society for Technology in Education Web site: http://ww2.iste.org/starchart/

[12] Retrieved September 16, 2002 from the OSPI Web site: http://www.k12.wa.us/assessment/NineCharact.asp

[13] **RCW 28A.150.210**
Basic Education Act -- Goal.
The goal of the Basic Education Act for the schools of the state of Washington set forth in this chapter shall be to provide students with the opportunity to become responsible citizens, to contribute to their own economic well-being and to that of their families and communities, and to enjoy productive and satisfying lives. To these ends, the goals of each school district, with the involvement of parents and community members, shall be to provide opportunities for all students to develop the knowledge and skills essential to:

(1) Read with comprehension, write with skill, and communicate effectively and responsibly in a variety of ways and settings;

(2) Know and apply the core concepts and principles of mathematics; social, physical, and life sciences; civics and history; geography; arts; and health and fitness;

(3) Think analytically, logically, and creatively, and to integrate experience and knowledge to form reasoned judgments and solve problems; and

(4) Understand the importance of work and how performance, effort, and decisions directly affect future career and educational opportunities.

[1993 c 336 § 101; (1992 c 141 § 501 repealed by 1993 c 336 § 1203); 1977 ex.s. c 359 § 2. Formerly RCW 28A.58.752.]

[14] See also Becker (1999): 22. In the review of Internet use by teachers, Becker sought to examine teacher attitudes about what constitutes good teaching and how that relates to Internet use. His survey analysis distinguished several factors related to constructivist versus traditional pedagogy, including disagreement with traditional pedagogy and learning theory, frequent use of projects and demonstrations, and frequent practices requiring heavier student responsibility.

[15]The Metiri Group (n.d.). "Range of Use." Retrieved August 12, 2002 from The Metiri Group Web site: http://www.metiri.com/WebInvestigation/RangeOfUse.htm.

[16] Becker, H., 1999: 3. Becker's qualification brings up an important point, namely, that merely measuring the ratio of computers to students in a building does not provide the finer grain detail of how appropriately and effectively computers are deployed within a building.

[17] "In 1996, a third of 4th graders and about a quarter of 8th graders reported that they used computers at least once or twice a week. Four years later, the reported levels of use were unchanged" (Education Week, 2002: 56).

[18] The Technology Support Index was developed by Dr. Chip Kimball in conjunction with ISTE and the Bill & Melinda Gates Foundation. Retrieved September 6, 2002 from the ISTE Web site: http://tsi.iste.org/techsupport/

[19] Retrieved August 30, 2002 from the Progressive Policy Institute Web site: http://www.neweconomyindex.org/states/2002/endnotes.html#23

[20] "Funding, Maintenance, and Hardware: Dilemmas and Some Proposed Solutions for Washington State Schools." Unpublished document from the Technology Alliance.

[21] Additional information on the Teacher Leadership Project is online at: http://www.esd189.org/tlp/index.html

[22] See, for instance, the Center for Applied Research in Educational Technology (CARET) at: http://caret.iste.org/index.cfm?fuseaction=questions&topicID=1

[23] Adapted from Dede, C. (2001). *State Policy Framework for Assessing Educational Technology Implementation, Version 4.* (Unpublished manuscript).